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EDITORIAL NOTES.

Coal Commissioners' Report—A Proposal Involving the Gas Industry.

MASTERLY and far-reaching! That is the general verdict upon the report of the Royal Commission on the Coal Industry which was issued last week. Agreement with the verdict, and admiration for the thoroughness of the investigation which Sir Herbert Samuel and his colleagues made, do not deprive anyone from dissenting, if thought fit, from any of the conclusions. Nothing in this way in connection with the coal-mining industry, it must be admitted, has ever been done which has shown so much perception, penetration, and breadth, and which has been so promising from the constructive point of view. Yet it will not give universal satisfaction—especially to the coal owners and the miners. It may not in parts meet with the undivided approval of the men of the gas industry, who will see in certain places the need for very diplomatic investigation and movement in order that, should developments be proceeded with which affect the interests of the industry, efforts may be made to ensure they are of a beneficial order. It could not be expected that the Commissioners would be able to produce a report which would immediately bring a peace which the parties most intimately concerned and successive Governments have failed to effect. The report, however, is fundamental. It recognizes, as did the reference to the Commissioners, that peace within the industry is something which depends upon an improvement of its economic conditions, which have fallen to a parlous level; and it is upon those economic conditions that there should be concentration and an expenditure of effort by all concerned, if a lasting peace is to be ensured. Hours and wages do not constitute, in the state of things to-day, the cardinal matters; they are rather a phase of a very big problem, which has to be considered, as the Commissioners have attempted to consider it, in its entirety. It is only upon the improvement in economic conditions that present hours can be maintained, and wages be fixed at a level consistent with the circumstances of any time. It has to be recognized—particularly by the Miners' Federation—that the economic conditions of the industry have changed considerably the last few years, and that there must be a remodelling of procedure to meet those changes. If there is not, then there can be no hope of improvement for the miners. Everybody directly concerned will have to subscribe something towards producing the better conditions. There is in the report irrefutable evidence of this. It is not the slightest good thinking that, in the present state of the world's fuel supplies, the old numerical order of employment in the British coal industry will be restored. That can only come about by developments which will give us a supremacy in coal competition beyond our shores. The Commissioners fully realize that there will have to be a transfer of mining labour to other spheres of work; and they recommend that this shall be the subject of Government aid, but there is to be no more direct subsidy for the industry. They do not suggest a change in the standard working day of the miners; but they do say that there must be lower wages if the present hours are retained. We would rather have seen a definite recommendation as to wages having some relation to production, according to the working state of a pit. Among other recommendations of the Commissioners are that there shall be meetings between owners and men, nationally and sectionally, to discuss wages. Profit-sharing is considered to be a matter which should be obligatory; and later on, when conditions are more favourable, annual holidays are recommended. There is to be no nationalization of the mines; but it is proposed that the State should acquire royalties by purchase where coal is proved, while in new fields the mineral is to be declared State property. Amalgamation or closing-down of small mines is proposed; and so is closer association of the mines and the gas, electrical, and allied industries. Coal Commissioners are proposed, with the formation of a National Fuel and Power Committee, whose functions would be of an advisory order. State provision for scientific research into the winning, preparation, and utilization of coal is strongly advocated.

The report is too extensive for us to deal with its component parts at any length in the editorial columns; but a survey of the features more interesting to the gas industry is commenced in other columns. To our industry the document is of fundamental importance, in respect of the future of coal supplies and prices; and it is of interest in regard to suggested constructive development. Concerning the former, a study of the report makes it clear that the opinion the Commissioners have formed is that the coal industry needs a reorganization compatible with the mutations which have so seriously affected it. The failure to recognize that new conditions over which an industry has no control may demand internal changes to meet them, is a besetting evil of many old industries. If this report means anything, it is that coal mining provides a case in point; and this applies not only to the owners but to the miners. The blame can honestly be spread. However, the Commissioners are clearly persuaded that the time is overdue when there should be development of an order abreast of the new circumstances of the age—development economic and scientific, with the requirements of other interests brought into account in a manner which will subscribe to the internal economy of the country. Increased prosperity must come largely from within the industry; and it can come if a broader view be taken, common sacrifices made, and the results of scientific research be applied. The gas industry wants to see that greater prosperity, if it will mean peace, and the provision of clean coal at a reasonable price. Those are considerations particularly desired by an industry engaged in the provision from coal of gaseous and smokeless fuel. And the Commissioners are convinced that "if the present difficulties are wisely handled, the mining industry, with the aid of science, will certainly recover, and even surpass, its former prosperity. It will again become a source of great economic strength to the nation."

But there is the other point. We are face to face with a suggestion for development—good in itself, but which will need careful statesmanship, if it comes to pass, to see that in the innovation there is ample safeguarding of interests. It is clear that the Commissioners have, as the result of their investigation, arrived at the view that the problem of the coal-mining industry does not stand alone, and that, in considering reconstruction or reorganization, due regard should be paid to the general welfare and economy of the country. There is evidence of this in several parts of the document. We have it where the Commissioners treat of the preparation of coal for the

markets. They have been duly impressed with the uneconomy that is scattered over the country by the uncleanliness of much of the coal that is distributed. They have also had their minds thoroughly infused by the enormous waste that proceeds from day to day by a large proportion of the 147 million tons of coal annually consumed in this country being burned in a raw state, to the end that valuable constituents are lost without serving any good purpose, but, on the contrary, causing pollution of the atmosphere. While dealing extensively with this and cognate matters, they also suggest ways for bettering the retail distribution of coal. They look sympathetically upon the efforts that have been made to place the low-temperature system of carbonization on a commercial plane—so far without success; and they advise the Government to continue research in this direction. In this connection the Government are reminded that, in their numerous establishments, they could provide the initial outlet for the coke, while the Navy, the War Office, and the Air Ministry could at the start absorb the home-produced oil and spirit, instead of imported. This is on the lines of a suggestion in one of our recent articles dealing with the formulation of a developing policy for the gas industry.

The broad view which the Commissioners take of the relationship of the mining industry to the coal-using industries, and of the latter to national economy and health-giving conditions, opens up a vista of co-operation and co-ordination which, if not entirely new, may have important issues, now that it has been introduced to the notice of the Government and Parliament, with the imprimatur of a Royal Commission upon it. There is also in this a condemnation of the narrow action of the Government in dealing with the development of electricity generation and distribution as a thing apart from a common problem affecting the utilization of coal, the provision of heat as well as power, and many products indispensable to industry, which can only be rescued from coal by the process of carbonization. The Government published their Electricity Bill at the end of last week; we hope the members of the Cabinet and of the Houses of Parliament will read and mark the words of the Commissioners:

> It has been strongly impressed upon us, as the outcome of our inquiries, that it is an error to suppose that the only, or even the principal, object to be aimed at in this connection is the most economical method of producing electricity. The object to be aimed at is the most economical and efficient way of utilizing the energy embodied in the coal. The question is not the co-ordination, as is often supposed, of two industries (coal and electricity), but of several—coal, electricity, gas, oil, chemical products, blast-furnaces, coke-ovens, &c. Two or more methods, dealing with two, three, or more of these, may be used simultaneously in combination—one feeding the other.

It is urged, as a point of importance, that no obstacles should be placed in the way of the development of such combinations, in whatever manner engineering and chemical skill and economic conditions may indicate as the most suitable. And again,

> It should be clearly recognized and constantly emphasized, that the interests of the industry of mining, gas-works, electricity stations, coke and bye-product undertakings, and blast-furnaces are closely interlocked.

Those are deliberate words from a broad and deep consideration of the subject. They bear directly and pertinently upon matters which have been recently discussed in the gas industry, and will be to a still greater degree. They bear directly upon the attitude which the Government have adopted in connection with the supply of electricity, and in which they have patently gone astray; and not without interest in this connection is the inclusion of a former suggestion as to the utilization to the full of waste heat for the provision of power. These expressions of view from a Royal Commission must not be allowed to recede into oblivion. They must be kept to the fore during the next few months while the Electricity Bill is being discussed. There is enough in them to justify the Government in withdrawing a Bill which is founded on an "error," and takes no account of what is necessary in the interests of the country—"the balancing of a variety of factors, and often of a combination of possible processes." The Coal Commissioners have learned in a few months what Governments have never learned in as many years.

But where does this lead? The Commissioners propose the appointment of a body of Coal Commissioners mainly to deal with the national acquisition of the coal upon which royalties are paid. The gas industry, it is pointed out, has its own National Council; and there are the Electricity Commissioners. While the Royal Commissioners have not had an opportunity of discussing the matter with these bodies, and therefore abstain from making a definite recommendation, they suggest for consideration the formation of a Standing Conference composed perhaps of the Chairmen and other representatives of the three organizations. They submit that the body, which might be known as the National Fuel and Power Committee, might include also the representatives of oil interests and of the coking, bye-products, and chemical industries, as well as of the Association of Municipal Corporations and the County Councils' Association. The functions to be exercised by the Committee would be advisory, and not executive. The suggestion shows that the Commissioners are strongly of the view that there is room for a large and effective co-ordination of work (while retaining private enterprise) connected with the provision of heat and power for the country, which would promote the general efficiency. All this is in the body of the report; but in the "Summary of Findings and Recommendations," the definite proposals appear:

> A closer connection of mining with the allied industries should be promoted. . . . The heat, power, and light requirements of the country should be under the constant and comprehensive survey of a body formed for the purpose. We propose for consideration the establishment of a National Fuel and Power Committee, with advisory powers, composed of representatives nominated by the Government from among the official and other bodies concerned.

The value of this suggestion would depend largely upon the constitution of the Committee and upon the functional scope. It is a matter which might require very serious consideration and discussion from the point of view of future protection.

The report constitutes a clever examination of the position of the coal industry and the possible means of correction; but there is nothing in it (no sentient person expected it) which can bring about a transformation in the mining industry without the expenditure of time. It must be studied in its entirety; for it is a document filled with fact, consecutive argument and construction, and deduction and recommendations based on the whole. As already said, it will not in every part please those most intimately concerned. Already there has been the criticism from certain interested people that there is nothing in it which will do any real good. Those who have made that criticism, though immediately interested, have never themselves proposed anything of a constructive nature for the betterment of the industry. There is one thing that is abundantly clear—the report is the work of men who have carefully fulfilled the trust reposed in them, and who have sought, with strict impartiality, to discover from the evidence submitted to them what is economically wrong, what are the remedies, and which are the ways to greater development in the interests of both the industry and the country. But improvement and development can only come gradually. The Premier has appealed to all concerned not to form any hasty judgment. The situation is too momentous for light treatment.

Government Electricity Bill.

At the end of last week, the long-awaited Government Bill for the development of electricity generation and transmission was issued; and, in other columns this week, a digest of the essential provisions is published. We defer a general comment until next week. As will be seen by the preceding editorial, the Royal Commission on the Coal Industry are of opinion that to deal with the electricity problem apart from that of heat and other matters

is wrong. In their report, sufficient reason is given to justify the Government in abandoning the Electricity Bill, and then discussing the question of power and heat, in a comprehensive and rational manner, with the three interests mainly involved and economically inter-related—coal, gas, and electricity. The service and economy of the whole country should be the first consideration; but in any co-ordination of the work of the three industries, there would be no need for such bureaucratic control as is obviously contemplated, under the present Bill, for the electricity industry. Reading through the Bill, it will be seen that there is not a feature in it or in the functions of the Central Board over which the Electricity Commissioners will not have dominant power and influence. As to the ratification of their doings by the Ministry of Transport—perhaps the less said in praise of such provision, the better.

The Midland President on Reorganization.

A FEW weeks ago, at a private meeting of the National Gas Council, the President (Mr. D. Milne Watson) said that one of the first things gas administrators should do in these times is to ensure that their undertakings are equipped and organized in such a manner that they can face the fiercest competition. Only those boards of directors, gas committee men, engineers, and managers who are in a permanently somnolent condition will fail to see the significance of the advice. It is a matter of the most pronounced importance; and therefore it was with no little interest that we found the address of the new President of the Midland Association of Gas Engineers and Managers (Mr. F. C. Briggs, Assoc.M.Inst.C.E., of Dudley) dealt with the question of organization. To him organization means the existence of a state of affairs which, in any and every department, will bring the maximum good to the undertaking—nothing fanciful or excessive, but organization of a really productive order. It should start at the beginning of expenditure and operations, and not be discontinued until the point of gas consumption is reached. We admire the breadth of view composing the address; we congratulate Mr. Briggs and the Dudley Gas Company on the testimony afforded by the undertaking of the beneficial effects of applying principles which the President so strikingly advocates, and which have made the concern, we will not say completely proof against, but capable of offering strong and successful resistance to any attacks of competition. And this despite the fact that at the close of the war the Company found themselves severely handicapped, owing to the conservative policy which had prevailed in the years preceding the great catastrophe. In the industry, the Company did not stand alone in that respect. It was a condition of things that was all too common then; it is a condition of things that obtains in not a few undertakings to-day, constant warnings notwithstanding. We are sorry that to-day a commodity like gas should be exposed anywhere to such administrative incompetence, but there is no question that during its continuance Nemesis is at work. The Dudley undertaking, though operating in circumstances not the choicest, though suffering the above-mentioned handicap when it emerged from the war period, is now so well constituted that its classification is with the most progressive gas concerns of to-day; and a robust state is very necessary in order to meet competition to the best advantage. That state has been brought about by the application of a revised policy and a thorough study of organization, with the view of applying the best principles within the limits of practicability to the business. In considering the efficacy of the policy of reorganization, it must be remembered that the local population is largely of the working class; and this fact goes to emphasize the success. Since 1914, the number of consumers has been increased from 6768 to 10,103—an increase of 49·27 p.ct.; and the consumption of gas from 199 to 276·3 million c.ft.—an increase of 38·8 p.ct. The average price of gas is now only 47·7 p.ct. above that of 1914; and the capital charges have been reduced from 10·6d. to 8·9d. per 1000 c.ft.

With capital charges standing at 10·6d. per 1000 c.ft., the Company found themselves severely shackled in dealing with the task which it was imperative should be faced; but the wisdom of what was done is to-day certified by the results. Mr. Briggs gives in a nutshell the lines of policy determined upon. He writes: "The problem therefore "appeared to be to refrain from adding capital expendi- "ture, to reorganize the Company, to deal with the con- "sumers on more approved lines, to increase consump- "tion by service and propaganda (so reducing capital "charges), and to meet the demand for increased gas "out of revenue as far as possible by replacing plant "with more efficient types, always keeping watch that "the price of gas should not be unduly inflated, and "should be regularly, if slowly, reduced." Passing on, the President gives information as to his new Humphreys & Glasgow water-gas plant and the Glover-West vertical retort installation, including waste-heat boilers; and as to the gas and coke making results. They are in the address for inspection; and they are good. From the technical point of view, there are several interesting incidental points which will attract attention—particularly the description of the mechanical pump lubricator. New condensing plant of the Holmes type has also been installed. The works have been, to the extent necessary and possible, well reorganized; and this has been supplemented by a high standard of organization on the district. No one can dispute that to inspire confidence among the consumers by work and ensuring good results is better than merely asking them to have confidence in the gas undertaking. Good service is impressive and lasting; and it is the best business developer—among both existing and potential consumers—of which we know. Of primary importance is the maintenance of consumers' appliances; and, by trial and experience, the most effective system that Mr. Briggs has found has been free maintenance of all appliances—whether on hire, hire-purchase, or the consumers' own property—with a charge for materials. Parts of hire-purchase appliances that become defective during the hire-purchase period are also replaced free. The scheme has been very successful. Of course, in different districts, the methods of business that are most advantageous may vary. Methods cannot be universally standardized, though as a policy we should, in every sphere in these times, favour free maintenance, with a charge for materials. In regard to hire-purchase or simple hire, in some districts the former obtains poor patronage; in others, the contrary. It is interesting to find that, though such a large percentage of the Dudley consumers are of the working class, hire-purchase is a very satisfactory line; and the fixing of the appliances free is a strong inducement to business. If a consumer wishes to buy an appliance, he risks only a few shillings in doing so; and Mr. Briggs says it is surprising how few appliances on hire-purchase are returned. The Company do not attempt to make any considerable profit on them. The cost of free fixing is slightly more than balanced by the net profit; and it is a principle that no financial loss should be involved. In all directions, a careful examination is made with the view of fairly ensuring that the ultimate business will warrant generous dealing in the matter of appliances; and it is clear from the business development, the position of the capital charges, and the maintenance of dividends that the Company have been pursuing the right policy. Take as an example an agreement with the Corporation, whereby the Company's free-fitting installation of cookers and slot meters has been adopted in the housing schemes. This has resulted in the reinstatement of gas for lighting to the total exclusion of electricity. Though none of the houses has yet been occupied twelve months, the average consumption of the 120 completed ones is at the rate of 22,000 c.ft. per annum.

These are all questions of policy, but they form part of the scheme of an organization of affairs compatible with the requirements of the times and the intensified competition which has to be met. Everything is in favour of the adoption of a broad policy and the reinforcing of the position of the gas industry to the greatest possible extent. We have the Government electricity scheme. Overmuch may be expected of it in some quarters; but the boosting electricity has obtained through it is an incentive to greater activity by our competitors. The Coal Commission have just reported; and they refer to the national waste incurred annually by the burning of raw coal. Through the activities of the Smoke Abatement League

and of the "B.C.G.A.," and in other ways, people are learning more and more of the evil effects of the pollution of the atmosphere. Our electrical friends, the coal merchants, and the low-temperature carbonization advocates are all having their enthusiasm raised by these conditions. The President of the Midland Association urges that every gas undertaking should examine its organization from coal reception to the gas-consuming appliances in the district to ascertain that defences, policy, and activities have no inherent weaknesses, and that they are on the best possible lines. Good organization costs money; but organization of some kind must exist. It is part of every business. The cost in any case is not so great as appears on the surface. Real improvements in organization produce economies in some directions which are a set-off to increased costs in other directions. And without good organization to-day, there will be losses, which are expensive and wasteful. To the administrators of gas undertakings we would also point out that to-day there must be alert brains in executive positions; and to attract the best brains and the best service, commensurate recompense is an essential. The address of Mr. Briggs is worth study from many points of view.

Long and Good Service.

Members of the British Empire Gas Exhibit Committee and those of the General Committee of the British Commercial Gas Association have, in their separate capacities, had many happy meetings; but the joint one which they held on Tuesday of last week was (we venture to say) the happiest they have ever experienced. On this occasion they represented the whole gas industry in doing honour to a conspicuous worker—Mr. F. W. Goodenough, the Executive Chairman of the British Commercial Gas Association. Prefacing this, general and financial statements were presented relating to the Gas Exhibit at Wembley last year, and every satisfaction was expressed. Then the event; the principal mouthpiece for the industry being Alderman F. W. Phillips, of Salford. In considering the work of Mr. Goodenough, we must not forget that the actual conception and inception of the "B.C.G.A." was due to his advocacy, some time before the actual birth of the organization, of co-operative propaganda in the gas industry. From those days onwards, he has been the active spirit at the head of our publicity affairs. As we look back at what has been accomplished, we find ourselves fully conscious of the fact that it is not everybody who can organize general publicity for an industry such as that of gas, and has, as Alderman Phillips said, the capacity to seize and make use of opportunities for increasing the value of the propaganda. That is one part of the art of publicity. Another part is found in the manner of presentment; and this is divisible into such manifold forms that nobody but a man of ingenuity, robust initiative, enterprise, and with a strong instinct of suitability, is capable of making the best of circumstances. We recognize those qualities and traits in Mr. Goodenough; and, speaking from the national standpoint, he has now had an experience in these matters which is unrivalled in the gas industry. His distinguished services, self-sacrifice, and devotion to the interests of the industry in this particular direction (which is a direction which must be unremittingly pursued, with the industry exposed to so much competition) were at this meeting acknowledged, and appreciation shown, as well as expression given to the great regard which we all have for him, not only owing to his work, but on account of those personal attributes which endear a man to his fellows. The form which the tokens of appreciation and regard took will be seen from the report published in a later column. Of this we are sure, the address and the gift will be greatly treasured by him. It was perhaps natural that Mr. Goodenough should on such an occasion attempt to discount some of the personal credit which is his due by reference to the large financial backing and co-operation of the whole gas industry and the generous support which has ever been given by the Company with whose work he is intimately associated. But the wonderful financial backing and co-operation require a centre, an actively moving spirit, and someone whose past record is at once a persuasive instrument and a promise for the future. Many men might have tried, and failed, to do what Mr. Goodenough has succeeded in doing. We know, too, of the great assistance in his vast work which has been rendered by others. Those others will return the compliment by saying that he was the inspiring force. For all this, the gas industry has rightly shown it is truly thankful; and the Goodenough whom we know will, realizing this, be encouraged further to follow the road which he has trodden so long and so well.

Gas-Meter Prices.

For some time the question of the prices of gas-meters has been one much discussed in the gas industry. It is no secret that there are opposing views abroad; and we have no desire to become partisans in a matter such as this. But we may be permitted to say that it is a pity if—consciously or unconsciously—there is any misrepresentation of actions or intentions, as that can only do damage and introduce an unnecessary bitterness into industrial and trading relationships. In the controversy which has taken place, Messrs. Parkinson & Cowan (Gas Meters), Ltd., feel that their attitude has been misrepresented, and, this being so, the right of explanation is their due. They have issued a clearly framed statement which we publish in other columns this week. The simple facts as presented are these: There has been such keen competition in the prices of meters (through, it is obvious, production capacity being in excess of requirements) that there has been serious loss. Now it is obvious to all intelligent business men that the cutting of prices cannot continue to unremunerative levels without quality ultimately suffering, which in a mechanical measuring instrument such as a gas-meter, subject to modern gas-supply conditions, is something which must not happen. If it does, cheapness will be expensively paid for in maintenance and renewal, and through the item of unaccounted-for gas. Nobody can want cut prices at the expense of the efficiency or longevity of the instrument which is the arbiter between gas seller and consumer. As we understand the statement that Messrs. Parkinson & Cowan have issued, what they have been trying to formulate, in the hope that it would meet with general approval, is a scheme, with a profit-sharing basis, under which "gas undertakings would be guaranteed that all meter makers would supply only the best quality of meters at the lowest possible prices, consistent with quality and a fair margin of profit." This seems, having regard to the importance of quality in relation to the functions of meters, to be a very desirable object. But while a majority of the makers are in favour of such a scheme, a minority are not, and thus the *status quo* is being maintained. The scheme as put forward would involve amalgamation of firms; and the question for consideration is, Would amalgamation effect economies and ensure quality, while giving to the gas industry the benefit of a good share in the savings to be produced by the closing of superfluous factories, the better employment of plant and men by mass production, concentration, and supervision, and the other facilities which could be brought to bear upon reduction of costs? We are glad it does not devolve upon us to answer the question; but Messrs. Parkinson & Cowan submit—and other important makers agree with them—that these things are possible, and that buyers can be safeguarded. The manufacturers' profit would be limited to a moderate percentage return on the capital of a Central Company acquiring the shares of the different firms at valuations in which inflation would be studiously avoided. The economies resulting from joint working would to a large extent be applied for the benefit of the buyers; while the meter makers' inducement to work for such economies would be participation to a smaller extent in the result. This in effect is the application of the principle of the sliding-scale. The description of the scheme points to its being purely of a co-operative nature; and there is no question that the authors have sought to devise ways and means by which to avoid any semblance to, or the effects of, a "ring" (which is naturally repugnant to buyers), and to secure permanence of the co-operative conditions. The maintenance of quality, the regulation of profits, and the sharing of economies are not the rules of conduct adopted by a "ring." Furthermore, it is pointed out that buyers would have the benefit of all new invention, inasmuch as

this would have common application, instead of remaining the property of any individual firm. These are the features which strike us on reading Messrs. Parkinson & Cowan's statement, in which there is greater detail, together with the grounds of opposition to the scheme and a discussion of the objections. No one in the gas industry would accuse the authors of having any obscure motive in putting forward a scheme of this kind. Their reputation is a defence against any suggestion of an unworthy objective.

Trade Unionism and Discipline.

In all walks of life, there must be discipline, or we should never know where we are. There has recently been a demonstration of the want of discipline on the part of a small section—some 900—of trade unionists connected with the engineering trade unions; and they have put in jeopardy the work of nearly half-a-million of their fellows through disloyalty to their accredited representatives. Men who cannot be loyal to those whom they place in administrative and executive power are not true unionists. But those few hundred men have had a lesson which has shown them that membership of trade unions demands obedience to leaders who are proceeding in a constitutional manner, and in accordance with the agreements between themselves and the employers of their members. Trade unionism generally owes to the Engineering and Allied Employers' National Federation generous thanks for their action in showing their loyalty to a single federated firm—Messrs. R. Hoe & Co., Ltd.—who were the victims of this small group of defiants. To give notice of a national lock-out is an act which is not determined upon lightly or without excellent reason; for if unfortunately it had had to take place, it would have been a serious thing to the whole industry and the country through the interruption of work. This applies (among numerous others) to many of the member-firms of the Society of British Gas Industries; and this is a time of the year when they cannot afford to have a dislocation of their operations, unless there is sufficient cause. There was a sufficient cause in this case. A question of principle was at stake; and to have ignored it would have been an act of disloyalty to a federated firm, and would have created a precedent which would be for all time awkward for the engineering industries. By issuing notices of a lock-out, the Employers' Federation took the one and only course open to them in defence of the principle of the sanctity of agreements. The employers' action has also reinforced the authority of the leaders of our trade unions, which, in this instance, appeared to be tottering almost to the point of collapse. The leaders requested the recalcitrants to return to work; they refused. For the time being, the leaders hesitated to take the only step open to them against men who were disloyal to the authority which their membership of the seven unions concerned demanded them to uphold. The place of such men is outside and not inside a union; for instead of unity, they were the creators of disunity.

It will be useful to have on record the simple facts of this case. The men concerned made demands which could not, at their own instance, be conceded by Messrs. Hoe & Co.; and the firm urged the men to have the demands dealt with in accordance with the procedure laid down—local and, if necessary, central conference. The men refused, and ceased work to enforce their demands. The action was in direct violation of the agreements between the Federation and the unions under which conciliation procedure is set-up for the avoidance of disputes. The Executives of the unions were appealed to by the Federation to regularize the position by securing resumption of work, in order that any question at issue might be dealt with in the constitutional manner. After the stoppage had continued for several weeks, and the efforts of the Federation to secure the co-operation of the Executive Councils of the unions in honouring the agreements had failed, the Federation had no alternative but to give notice to dispense with the services of the members of the unions concerned in their employment, until such time as the unions saw their way to honour the agreements and secure a resumption of work. The Executive Councils of the unions were notified accordingly. Upon the receipt of this notification, the Councils instructed their district officials to secure a resumption, but the members involved and their supporters remained rebellious. It is, of course, essential in the interest of the engineering industry and all concerned that agreements should be honoured. Disruptive forces appear determined to destroy all agreements and conciliation arrangements. Much has been written and said in certain quarters as to the desirability of wrecking the trade unions, and replacing their authority by mob rule. It is clear that an attempt is being made by a minority to sap the foundations of constitutional trade unionism. Under the procedure laid down, stability has been secured, collective bargaining has been maintained and strengthened, and many hundreds of questions which might otherwise have resulted in stoppages of work have been amicably disposed of. The union leaders have on many occasions stated that in the result membership and funds of the unions have increased, and a greater sense of internal discipline has been induced. The restraint placed on individual action by employers has been the same as that imposed on the workpeople. This sound method of conciliation has been in jeopardy.

National Gas Council.

A note will be made by readers of the date of the annual general meeting of the Council. It has been fixed to take place in London on Tuesday, June 1. By that time we shall know the best or the worst regarding the coal situation. There will also be the developments in connection with the Government electricity supply scheme; and no doubt more will be heard of recommendations in connection with the gas industry's own domestic affairs.

September in Birmingham.

The capital city of the Midlands is always the centre of considerable activity; but in September next its attraction for gas men will be enhanced. The Smoke Abatement League are holding an exhibition there; and the gas industry has been invited to take part in it, as has the electricity industry. Both have consented; and there is bound to be considerable rivalry to make the best possible display and impression, inasmuch as conferences and other work which the Smoke Abatement League take in hand draw men associated with urban government from all parts of the country. The gas industry must put its back into this effort. Further particulars as to plans will be gathered from some remarks made by Mr. R. J. Rogers, at the meeting last Thursday of the Midland Association of Gas Engineers and Managers. The information will be found towards the end of our report of the proceedings.

A Housing Scheme and Gas and Electricity.

It will be remembered that a few months ago the Newport (Mon.) Gas Company secured a decision in Parliament which prevented the Corporation making conditions in respect of dwellings or other property over which they have jurisdiction which might be detrimental to the interests not only of the Company, but of people occupying such premises, by depriving them of the opportunity of choosing gas for domestic or other purposes. There was good ground for this action on the part of the Company, owing to the Corporation having made it a condition that the tenants of houses on their Somerton Estate should use electricity only for domestic purposes to the exclusion of gas. We are pleased to see that the Newport Corporation have, in respect of this estate, withdrawn from the attitude which they previously adopted. At a recent meeting of the Council, a recommendation was made by the Housing Committee that the Gas Company should be given consent to supply gas for heating and cooking, but not for lighting, to tenants who require a supply. Of course, there was opposition, particularly on the part of some of the Labour Party; but a majority of the councillors—including Alderman John Moxon, the former Chairman of the Electricity Committee—considered that the tenants should have freedom in this matter, and that the electricity undertaking should develop its business on its merits, and not by the aid of Corporation protection.

The result of the discussion was that the recommendation was carried by twelve votes to eight.

Views of the Tenants.

How the tenants on the estate regard the matter is shown by a canvass which the Gas Company made. The result is eloquent of the views of people with experience of electrical culinary operation. The total number of houses canvassed was 430. Of these 248 were found to be furnished with electric cookers; but in 106 cases gas cookers were asked for in substitution. In 65 cases the electric cooker was not in use; a coal range being employed exclusively for cooking purposes. In 55 instances only, the householders expressed themselves as satisfied with the electric cookers. In the majority of the remaining houses, cooking was done either by coal or oil; and the result was this Corporation Estate was one of the smokiest areas in the borough—presenting a marked contrast to private property in the neighbourhood where no restrictions had been placed on the use of gas-cookers. No comment is needed on these figures; the lesson is plain.

Tar and Bitumen.

According to the minutes of the Central Executive Board of the National Gas Council, it seems that trouble is brewing between tar distillers and municipal gas undertakings who have been purchasing bitumen and mixing it with tar to make a compound for use in road construction. One gas department, it is stated, has been threatened by a firm of tar distillers with an application for an injunction against them to prevent their continuing this practice. Other corporations have adopted similar procedure; and it is understood that certain distillers are combining to oppose them. Should these attempts to restrain the practice develop into action, the Central Executive Board have decided that the Council shall support the gas departments in question. In this connection, it is satisfactory to learn that tar producers and highway authorities are likely to get together with the view of ascertaining the actual requirements of the latter in respect of tar for road purposes.

Government Electricity Scheme.

In the "Yorkshire Herald," Mr. H. E. Bloor, B.Sc., B.Eng., has made an exposure of the poor foundation on which the Government electricity scheme has been based. In the first place, he proves that there is no universal endorsement of the scheme; and then he proceeds to show by material evidence how true were the words of the Prime Minister in his Birmingham speech that "cheaper electricity will not in itself serve industry," for "manufacturing power costs are but a small proportion of the total." Mr. Bloor quotes a statement made by the Chief Engineer to the Amalgamated Cotton Mills Trust in 1923, at an inquiry held by the Electricity Commissioners in respect of the Mid-Lancashire Electrical District, to this effect: "In some cases not more than 2 p.ct. of the value of the finished article is in power in the all-inclusive costs. In other cases, it is up to 4 p.ct., but very rarely more than 3½ p.ct. of the value of the finished goods." Statistics obtained from representative undertakings throughout the industrial field include the following: Engineering: 0·8 p.ct., 1·25 p.ct., 2·5 p.ct., 1 to 2 p.ct., 1⅛ p.ct. to 3 p.ct. Foundries: 0·7 p.ct. and 1 p.ct. Chemical process works: 4 p.ct. Brewing: 1 p.ct. Laundry trade: 3 p.ct. Cycle and motor firms: 0·003 to 3 p.ct. Woollen goods: 4 to 5 p.ct. It is further pointed out by Mr. Bloor that many industries require steam for process work, and can therefore raise their own power more cheaply than by purchasing central station electricity, however cheaply produced. Another interesting section of the article gives the information that in the production of one ton of pig iron from 18 to 30 cwt. of metallurgical coke are required, while in producing a ton of rolled steel sections, from 35 cwt. to 4 tons of coal are used, according to the methods employed. In addition to their heat requirements, rolling-mills employ power on a large scale; and it is noteworthy that the most economical system of working is to convey the coal to the mill, and produce the coke required on the site. The gas yielded is then employed in internal combustion engines to produce power. So efficient is this system that the coal consumption per ton of rolled sections can be reduced to 35 cwt., or less than one-half the average for the country. The peril which Mr. Bloor sees in the present unreasonable hopes founded upon electricity, and in particular the Government scheme, is that it may serve to distract attention from vital and urgent needs (such as cheap coal and transport and reduction of taxation)—needs which cannot await fruition of results from the scheme, even though ultimate results prove greater than experts now think possible.

PRESENTATION TO MR. F. W. GOODENOUGH, C.B.E.

The Industry's Recognition of his Good Work.

A meeting of the British Empire Gas Exhibit Committee, to which the members of the General Committee of the "B.C.G.A." were also invited, was held in the Council Chamber of the Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1, on Tuesday, March 9.

The meeting was convened for the purpose of receiving and, if approved, adopting, the accounts of the British Empire Gas Exhibit, 1925; and for a presentation to Mr. F. W. Goodenough, C.B.E.

Alderman F. S. Phillips (Salford) presided. After the minutes of the previous meeting of the British Empire Gas Exhibit Committee had been taken as read, approved, and signed, he asked the Chairman of the executive of the Gas Exhibit Committee (Mr. Goodenough) to present the accounts.

Mr. Goodenough, in doing so, expressed the opinion, which was heartily endorsed, that the gas industry had obtained very full value in return for all the money spent on the Wembley Exhibit, both at Wembley and in the extensive publicity given to it in the Press and by other means. After referring to sundry items in the accounts, he moved that the audited accounts as printed and submitted to that meeting be approved and adopted.

This was seconded by Mr. A. E. Broadberry (Hon. Treasurer), and was unanimously adopted.

At the request of the Chairman, Mr. H. C. Smith (Tottenham), who had acted as Hon. Treasurer for the subscribers to a presentation to Mr. Goodenough, read several letters of regret received from members unable to be present at the meeting, including one from Mr. J. W. Auchterlonie (Cambridge), who was one of the earliest supporters of the idea of such an acknowledgment of Mr. Goodenough's services.

Alderman Phillips said that, in being asked to take the chair on this occasion, a very pleasant and most agreeable duty had been entrusted to him, which he would endeavour to discharge to the best of his ability and, he hoped, without discredit to the occasion. He recalled the beginning of the "B.C.G.A.," when he made the acquaintance of Mr. Goodenough, who, fortunately, was ready and willing to take charge of its operations, and from year to year as time had passed had found, seized, and utilized opportunities for increasing its value to the industry, until to-day the "B.C.G.A." fulfilled a function which could not conceivably be dispensed with in the interests of the gas industry. From its very inception the industry had availed itself of the willing and untiring service of Mr. Goodenough, including the organization of the Centenary National Gas Exhibition at Shepherd's Bush in 1913, until the British Empire Exhibition came into view, when, under his direction, the Gas Exhibit so splendidly upheld the interests of the industry. Not only this, the second edition in 1925 was a worthy follower of the first. The work involved in arranging and carrying through the Exhibit reflected very great credit indeed upon the Committee responsible for it. All knew that Mr. Goodenough was capable of meeting any emergency, and it was a great delight to have him at the meeting in order that the industry's appreciation of so many years' service might be marked, and that all might give some little tangible testimony to the great personal regard held for him.

Alderman Phillips presented Mr. Goodenough with an Illuminated Address from the members of the British Empire Gas Exhibit Committee and the General Committee of the "B.C.G.A.," and asked him to accept with every good wish for his future health, welfare, and prosperity this memento, accompanied by a collection of Heppelwhite chairs, in recognition of his valuable work for the gas industry.

Mr. Goodenough, who was received with great cordiality, said he found it exceedingly difficult to frame words in which to express the feelings which were his after hearing the very kind things that had been said about him, and the warmth which all had showed towards him. He felt that a great

deal too much had been made of the small service which he had been able to render, and a great deal too much personal credit had been attributed to him for the successful work at Wembley and elsewhere, none of which would have been possible but for the wonderful financial backing and co-operative work of the whole industry, and without the great generosity of his own Company. He did not refer to the financial backing which the Company had always given to national work for the industry, but to the consideration in time and assistance to enable him to do the national work entrusted to him. So far as Wembley was concerned, he was receiving all the credit due mainly to the work of others. Ideas came from others; the execution of the ideas was carried out by others; and the wonderful work done throughout by the staff finally made it possible to achieve the considerable measure of success that had been secured at Wembley. As he had already said, he felt that an enormous amount of good had been done to the industry by the money spent in connection with Wembley. As to that, he had no hesitation in asking credit for those who did the work. All he deprecated was having the credit given so generously to himself. Mr. Goodenough added that it had always been a labour of love to work for the industry, because he always had such wonderful backing from all the Committees which were one and all animated by the true spirit of co-operation. They had never known what it was to take a vote, for they had always been able to arrive at a unanimous decision. This did not mean that they never had any differences of opinion or of points of view, but that, being animated by the single purpose of serving the industry, they had always been able, after full and frank discussion, to harmonize their points of view and arrive at unanimous decisions. He had always derived the greatest pleasure from working with the Committees of the Association and of the Exhibit. Mr. Goodenough concluded by thanking Alderman Phillips for all he had said, and for his unfailing support of every enterprise on behalf of the industry.

Mr. J. H. ELLIS said that Alderman Phillips had spoken so eloquently that he could find nothing to add except that, with everyone else, he (Mr. Ellis) thoroughly agreed with all his friend had said.

Mr. MILNE WATSON remarked that it gave him very great pleasure to add his testimony to the appreciation that had been expressed by Alderman Phillips of the work of Mr. Goodenough as Executive Chairman of the British Empire Gas Exhibit and of the "B.C.G.A." As Governor of the Gas Light and Coke Company, he (Mr. Milne Watson) was proud that his Company was the means of providing the industry with such an excellent officer and Executive Chairman. Any cause that secured Mr. Goodenough as a champion was most fortunate.

ELECTRICITY SUPPLY MEMORANDA.

Depreciation of Wiring and Confidence.

ELECTRICAL men are still agitated over the influence on the public mind of the newspaper discussion regarding the harvest of disastrous fires that there has been of late, and which has been recently enlarged. Flippant and other inane treatment of the matter does not satisfy the public. They want more than that, and something better than flat contradiction, to convince them. Electrical journalists would show greater discrimination if, instead of pursuing those methods, they supported the common-sense counsellors who urge the electricity industry to deal with a matter which is of pressing importance to it. This was brought plainly to notice by Mr. S. G. Castle Russell, who, it is stated, has had forty years' experience of inspecting electrical installations for insurance purposes. No man can therefore know more than he of what he is talking about when on this subject. He did well to make his points in "The Times;" and the action would have had greater effect had his views received wider distribution by insertion in other popular papers. If the electricity industry will not move in the way which he advises, then they may be made to do so by public pressure—if the public be thoroughly educated up to the need. It is not a question as to whether electricity has been responsible for one or more or all of the recent catastrophes, which have mostly been labelled "cause unknown." It would, of course, be satisfactory to know the causes—whether electrical or any other; but where electricity is concerned, however much it is guilty, it does its best to hide the circumstance. Some of the fires have occurred in the upper parts of the houses, which limits the causes to electricity, defective flues, or rascality. It would be a strange thing if flues had suddenly become defective in the wholesale manner which has been suggested. The real question raised by Mr. Castle Russell is the necessity for the renewal of wiring, owing to the perishing of the insulation, together with the need for owners satisfying themselves that their installations are not a potential danger. But that is a trouble. Householders are not instructed how they should proceed to satisfy themselves that their installations are in as trustworthy order as they can be made. Furthermore, a large proportion of householders are negligent. We know this in connection with gas supply. They smell an escape of gas; they cannot smell an escape of electricity. They often allow the known escape of gas to continue without calling attention to it. The case is worse with the perishing of the insulation of their wires, as there is nothing to remind them that the process of deterioration has been going on. Mr. F. J. Moffett, B.A., M.Inst.E.E., in the "Electrical Review," supports Mr. Castle Russell's statement. He says that many instances of installation have come to his notice "where the insulation of the wiring has become perfectly brittle, and has developed open cracks. Such conditions are favourable to leakage of current. But even at the present day, a vast number of houses are being wired in a manner which causes those who are aware of the risk to experience a feeling of alarm." The register of dependable contractors will do something to ensure good installation; but that fact must not lead to a rest-and-be-content attitude. There is the deterioration to which Mr. Castle Russell and Mr. Moffett bear witness. Deterioration of installation suggests inspection. The householder is not likely to undertake this; it is more probable he will neglect it, unless frightened into an acceptance of responsibility for seeing that it is done. This would not suit the electricity suppliers; so that the obligation of inspection rests between them and the insurance companies. Mr. Moffett suggests that "the fire insurance companies as the protectors of the public against fire risk are the most suitable people to take responsibility for systematic inspection of installations—more especially during the progress of the work." In our opinion, it is not only during the progress of the work, but during the progress of deterioration that periodical inspection is required. In this both the insurance companies and the electricity suppliers are concerned in defence of their respective interests. What is wanted is that the insurance offices and the electricity suppliers should put their heads together to devise a system of inspection for their mutual protection. But the correspondence shows that inspection confined to the installation when new would not be of permanent use. A dangerous state is created by age, so that periodical inspection and testing are necessary.

On Relative Efficiencies.

Our electrical friends when they attempt to tackle the question of the relative efficiencies of the gas and electricity processes usually make an unholy mess of it. "Hotspot," the writer of "Cooking and Heating Notes" in the "Electrical Times" is not different from many of his colleagues. He seems to have little patience with those fanatics or patriots who talk of coal conservation and have some regard for their descendants. He thinks posterity is in a fair way of becoming a pestering nuisance. He believes that we should utilize our national coal supply in the way that will ensure the greatest beneficial service to present-day humanity. We agree with him; but not with his idea that, for all the purposes which the electricity industry desires to incorporate in its trading, "the greatest beneficial service" is to be obtained by the generation of electrical energy. There are limits. However, as we understand the prefatory remarks of our friend, these matters do not trouble him. His view is, Let us eat, drink, and be merry over the extravagant use of our coal, for to-morrow we die. This is unadulterated selfishness. He blandly asks the question, How can one reconcile the statement that, in part at any rate, the shrinkage of the coal markets, at home as well as abroad, is attributable to the increasing development of electrical power with the thermal efficiency calculations of gas advocates? The major shrinkage in coal consumption at home is due to the trading conditions of our industries. Such part as the electricity industry has had in producing the shrinkage is due to the displacement of wasteful steam plants worked at low efficiency, and for purposes for which the electrical drive is more convenient. There again there is a limit, beyond which the gas-engine or the steam-engine is the more economical, depending upon the work to be done. But if the electricity industry penetrated far into heating, "shrinkage" of coal consumption would rapidly cease, and the trend would be the other way. As to the shrinkage of consumption of British coal abroad, there are two reasons for this—the big extension of the use of water power in countries blessed with it, and yet poor because they have not their own coal supplies, and the tremendous development there has been in the use of the brown coal of Germany. "Hotspot" thinks that, if the efficiency computations of the gas industry are right, the mining industry ought, through the electricity industry, to be in a flourishing condition. The mining industry is not in a flourishing condition; and where are the calculations of the gas industry wrong? It may be suggested that "Hotspot" should go into the matter a little deeper than he has evidently done up to the present.

The Efficiency of the Gas Process.

It is easy for a writer with obviously no real knowledge of the facts to go astray over the matter of relative efficiencies. "Hotspot" has been reading Dr. Margaret Fishenden's paper at the Society of Arts. He finds that of every ton of coal used for gas production only 25 p.ct. of the initial heat value is available in the gaseous product. Therefore, to his mind, it is "misleading to suggest 50 to 55 p.ct. as the efficiency of gas manufacture." Necessary to the justification of this is, from his limited knowledge of the matter, that for every heat unit used in the gaseous form, two heat units must be consumed as solid fuel. And so he runs on to say that, on this basis, gas can "never" supply more than one-third of the national heat requirements; the bulk of heating service being left to solid fuel as at present. Not necessarily, Mr. "Hotspot." If economic conditions prompted, and the requirements of the nation for the gas industry's secondary products became more than satisfied, the industry would launch-out into complete gasification of (at any rate part of its) coal, and, with the efficiency of complete gasification, we should get in thermal result in the gas the percentage electricity loses in its process as conducted at its best stations, and the percentage of our loss would be the percentage of the total efficiency at super-power stations. But economic considerations do not suggest that complete gasification is necessary at present, other than in exceptional circumstances; but we do not know what may come. However, "Hotspot" need not worry about the gas industry planking on the market more solid smokeless fuel for longer than it is required, when experience shows the limits of absorption have been definitely reached. Already it uses a substantial proportion of its own coke in gas production. But passing to Dr. Fishenden's figures for efficiency of gas manufacture, the total is an under-estimate for modern working, as "Hotspot" can prove by taking the data of the chief concerns supplying such a large proportion of the gas supply of the country. Does he realize that the Gas Light and Coke Company alone supply more heat energy in their gas through the consumption of a little over 2 million tons of coal than the whole of the electricity supply industry with its consumption of several million tons of coal, and yet the Gas Light Company have a large amount of solid fuel, tar, pitch, chemicals, and sulphate of ammonia to place on the markets?

The Figures Examined.

Let us get to the figures given by Dr. Fishenden in her paper They are supported, with a margin to spare, by daily practice; and for the benefit of electrical critics we will extend them. Take a coal having a potential heat value of 28,800,000 B.Th.U. per ton, or 12,857 B.Th.U. per lb. Day by day 72 therms, or 7,200,000 B.Th.U., are being produced from such a coal. Coke for sale (say, 10 cwt. at 11,750 B.Th.U. per lb.) would account for another 13,160,000 B.Th.U.; and the tar, at 5 p.ct. of the original heating value of the coal, 1,440,000 B.Th.U. There we have 21,800,000 B.Th.U. accounted for, or 75·6 p.ct. of the original heat value of the coal. Does our friend see anything wrong in those figures? Now if we have 10 cwt. of solid fuel of a potential heat value of 11,750 B.Th.U. per lb., then we restore to the solid fuel market 13,166,000 B.Th.U., equal in heating value to 1023 lbs. of the original coal; so that it may be said that 1217 lbs. of coal is actually used in the manufacture of gas, tar, and sulphate of ammonia, which coal is equal to 15,626,969 B.Th.U. Putting the whole of the heat expenditure in the process of making not only gas and tar, but smokeless solid fuel, on to the gas, we have 7,200,000 B.Th.U. in the gas and 1,440,000 B.Th.U. in the tar, or more than 50 p.ct. of the heat of the 1217 lbs. of coal. Does "Hotspot" see anything wrong in this? If so, we hope he will point it out to us. Then, of the balance of the heat, in modern practice a portion is used in waste-heat boilers for the production of steam, which adds something more to the 75·6 p.ct. alluded to above. Subterfuge, pretence, and muddling will not destroy something which is an accomplished fact in daily practice. Why electrical people should think credit should not be taken for the smokeless solid fuel and its heat value derived from the gas process, and prefer to regard the whole of the coal as having been expended in gas production, passes our comprehension, as it does common-sense. One other set of figures to show that the gas industry has not been, and is not, standing still in the production of efficiency. In 1904 the statutory part of the industry carbonized 14,295,602 tons of coal; in 1924, 17,944,377 tons—an increase of 3,648,775 tons, or 25·5 p.ct. In 1904, the statutory undertakings sold 155,579,725,000 c.ft. of gas; in 1924, 241,018,701,000 c.ft.—an increase of 85,438,976,000 c.ft., or 54·9 p.ct. Thus with a 25·5 p.ct. increase of coal, a 54·9 p.ct. increase in demand has been met. If "Hotspot" desires to deal with our data (we hope he will do so), we will see that it does not go short of attention. Meanwhile, when he talks of low prices for electricity, he should remember the difference between 100,000 B.Th.U. and 3412 B.Th.U.; also that there are gas undertakings supplying now at 6d. per therm for ordinary purposes, and Sheffield for power and industrial heating is down to 4d. per therm. Proximity to coal supplies makes all the difference in this respect as compared with London and the South.

NATIONAL GAS COUNCIL.

The Central Executive Board of the National Gas Council met on Tuesday, March 9, at 28, Grosvenor Gardens, S.W.—Mr. D. Milne Watson in the chair.

Government's Electricity Proposals.

The work undertaken by the Special Committee since the last meeting of the Central Executive Board was reported and approved.

Great Yarmouth (Gas) Special Order.

It was now stated that the question of the delay in the proceedings with regard to this Order (when petitioners, who had failed to raise objections at the inquiry before the Board of Trade, were heard when the Order came before Parliament for confirmation) had been brought forward at the meeting of the Joint Conference of Public Utility Associations held on Jan. 28. A strong resolution had been passed, and forwarded to the appropriate Government Departments and to the Prime Minister. The resolution stated that, if such practice was pursued, it would deprive promoters of the present advantages of Special Order procedure—viz., cheapness and expedition. An assurance was asked that in future the Government would take the necessary steps in such cases to ensure the passage of Special Orders through Parliament.

Railway Rates.

Standard Charges.—The steps which the Council had taken in connection with this matter were reported and approved. The Board authorized that Counsel should be retained, if necessity arose, to represent the National Gas Council at the inquiry by the Railway Rates Tribunal.

Tar.

(*a*) It was reported that a municipal undertaking had been purchasing bitumen, and mixing it with tar to form a compound for use in road construction. A firm of tar distillers had threatened to apply for an injunction against the Gas Department, to prevent their continuing this practice. It appeared that other corporations were adopting a similar procedure, and that certain distillers were combining to oppose them. The Board agreed that, if any attempts were made by the distillers to proceed against the undertaking, the Council should support the Gas Department.

(*b*) *Joint Consultative Committee of Tar Producers and Highway Authorities.*—It was reported that a meeting of this Committee had taken place on Feb. 12. A suggestion had been put forward that a small Joint Sub-Committee should be appointed for the purpose of carrying out experimental work with a view to meeting the requirements of highway authorities for tar for road purposes.

(*c*) *Draft Constitution for:*

(*a*) *Gas Tar Producers' Board.*

(*b*) *The British Road Tar Association.*

The Board considered and approved these draft constitutions. It was stated that copies had been circulated among members of the Coke and Bye-Product Plant Owners' Association, and that when this Association had agreed to the proposals, the draft would be forwarded to the Tar Distillers' Association.

World Power Conference.

A communication was reported from the Institution of Gas Engineers, nominating their President, Mr. C. F. Botley, M.Inst.C.E., to be one of the representatives of the gas industry on the proposed British National Committee of the World Power Conference.

Grand Council—Federation of British Industries.

Mr. F. J. Bradfield was appointed to represent the Council in place of Mr. A. A. Johnston on Main Group 14 (Public Utility), Sub-Group 3.

Mr. T. Hardie was appointed to represent the Council in place of Mr. A. A. Johnston on Main Group 9, Section 1 (Chemical Fertilizers and Explosives).

Rating of Machinery.

It was reported that a Committee had been set up by the Minister of Health to prepare a statement in accordance with the provisions of section 24 of the Rating and Valuation Act, 1925, setting out in detail all machinery and plant which appeared to them to fall within any of the classes specified in the Third Schedule to the Act. It was decided that the Council should make application for a representative of the industry to be put upon this Committee.

The date of the annual general meeting of the Council was fixed to take place in London on Tuesday afternoon, June 1.

EXAMINATION AND EVALUATION OF COALS FOR CARBONIZING PURPOSES.

By Geoffrey Weyman, D.Sc.

(*Continued from p.* 603.)

From the consideration of various methods of examination of coal, the conclusion has been drawn that at present some form of plant and method of operation constructed to imitate practice is the only available means of obtaining a basis for evaluation.

Coal-Testing Plants.

It is possible to isolate a portion of a works plant, or even take a whole works and establish it under test conditions. The effect on the general works results is excellent; and, of course, it is the aim of modern practice to bring all works up to test conditions, and maintain them at this level. But, as the size of plant increases, so the amount of coal used per day increases. The time during which a test on any particular coal lasts must also be increased, owing to the longer time necessary to attain equilibrium of the plant conditions as a result of the properties of the particular coal; and in the end it often happens that the time during which coal from one source lasts is not sufficient to enable static conditions to be realized, and the test finishes without any definite result. It may be more than 24 hours after a coal is charged before the coke from the same coal has found its way through the producers and furnaces. The difficulties of control are, of course, much greater as the size of plant is increased, while observation of the results is more obscured and often of doubtful accuracy. In most cases works receive more than one variety of coal per day; and it is therefore necessary to test more than one variety per day. The accuracy of the test results should be within ± 1 p.ct., since 2 p.ct. on the market price of coal at (say) 20s. per ton would be nearly 6d. a ton—a figure of some importance. The actual cost of a coal-testing plant and of its operation need not be very seriously considered, as a most pessimistic view of the saving caused by systematic checking is about 5 p.ct., or (say) 1s. per ton (or 0·17d. per therm). For each 100 tons carbonized per day, the minimum saving would amount to £5 per working day, which is sufficient alone to pay for the services of a competent chemist, and the capital and maintenance charges of (say) 20 p.ct. on an outlay of £500, with liberal running expenses and a substantial surplus. As a matter of fact, a plant should not cost half of this figure, since in the case of large plants the products are utilized in the usual way, and part of the charges are rightly put down to works costs. It ought perhaps to be pointed out that the saving effected by coal testing and evaluation might not be shown in a reduction in the cost of coals purchased. It is more likely that the results would show the benefit of purchasing the better-class coals even at higher prices; and the saving would then be shown by improved results from works practice.

It is not difficult to infer that the best scale of operation for coal testing will be that which is as small as possible compatible with getting a sufficient quantity of products for proper examination. Accuracy also demands a gas-tight retort—that is, a metal one. A plant on a scale of $\frac{1}{1000}$ ton per charge will give sufficient gas from each charge for actual determination of calorific value or any other test required, and sufficient coke, tar, and ammonia from the two or three charges which comprise a test. The time occupied is about 40 minutes per charge, so that two or three tests can be made in a working day. A plant of this size is easily controlled by one observer, and should be placed in a laboratory under good conditions, and where various instruments are available. The coal charges and products can be accurately weighed, and thermal and weight balances arrived at. It is true that the cast-iron retorts used in former days deteriorated so rapidly under the temperatures of 900° or 1000° C. required, that the results were entirely unreliable and discordant from day to day as the amount of scale on the surfaces increased. The introduction of the nickel-chrome-steel retort five years ago entirely altered this condition of affairs; and retorts of this metal have been used continually for 6 to 12 months at temperatures up to 1100° C. The normal working temperature is 1050° C., which is equivalent to that inside a modern horizontal retort. A considerable amount of time and trouble has been devoted to this size of plant since this special steel retort was first used, with consequent great improvement in method and construction of the plant. Recently Dr. E. W. Smith brought forward a compact specially-designed furnace which was made by British Furnaces, Ltd. This has proved much more serviceable and economical than the old muffle furnace formerly used, and has helped markedly in adding to the reliability of the results. At the same time the retort was constructed with the gas offtake pipe at the side, sloping down to a tar drain pot so as to save the rather marked cracking of tar, which dripped back into the retort from the old vertical offtake pipe. It is proposed to describe the plant as now in use and the method of operation, including several improvements resulting from collaboration between Dr. E. W. Smith, Mr. T. F. E. Rhead, and the writer.

$\frac{1}{1000}$-Ton Coal-Testing Plant.

The furnace in which the retort is placed is shown in figs. 1 and 2, and consists of a refractory-lined casing about 1 ft. 9 in. by 2 ft. by 1 ft. 6 in., containing the retort centrally placed on firebrick supports with gas space all round. After the retort is placed, broken refractory of about 1 in. cube is piled loosely against the retort in the manner shown, so that the burner nozzles project the gases down on to the surface of the refractory. The waste gases leave by the chimney above. There are two nozzles at each side connected to the air and gas supply pipes. The air supply under 8 in. to 12 in. pressure W.G. from a small electrically driven Keith-Blackman blower passes through the inspirator, drawing-in the correct amount of gas from the outlet of a special governor which reduces the gas pressure down to atmospheric.

Thus the injector works in the reverse manner to that of the ordinary atmospheric burner. The gas-air mixture is practically in theoretical proportion, and is maintained in this proportion very closely for all air pressures within the working limits. Thus the whole control is centred in the regulating valve on the air supply prior to the inspirator. The gas-air mixture passes to the twin burners on each side of the furnace by a sufficiently long pipe to ensure good mixing; and consequently the combustion is complete within the limits of the furnace—a very good performance for so small a furnace. In lighting-up, a long flaming torch is placed in each of the lighting holes, the air regulating valve is turned on, and then the gas supply. The burner pressure is adjusted to 6 in. or 8 in. W.G. at the start; and when the requisite temperature has been arrived at, it is reduced to about 2 in. A little experience will show what pressure is necessary to maintain the working temperature; and the regulating valve can be brought to the same point each day. The time occupied in reaching the working temperature is only about 45 minutes; and when this has once been reached, the temperature can be kept practically constant for hours on end. Owing to the absence of flame in the furnace, and as the heating is largely accomplished by radiation from the incandescent firebrick, the temperature is very even throughout the retort length. The retort projects sufficiently through the casing to allow the side gas offtake pipe to clear; and it is important to see that no furnace gases leak past the retort and casing, and heat the offtake pipe, as cracking of the tar will cause blockage. The retort is closed by a cast-iron door of the same shape as the faced-up end of the retort, and is provided

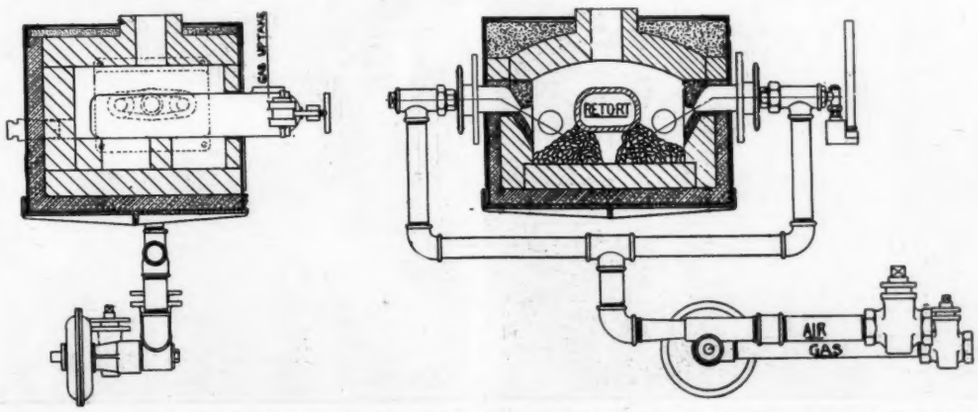


Fig. 1.—$\frac{1}{1000}$-TON COAL-TESTING PLANT. FURNACES AND RETORT BY BRITISH FURNACES, LTD.

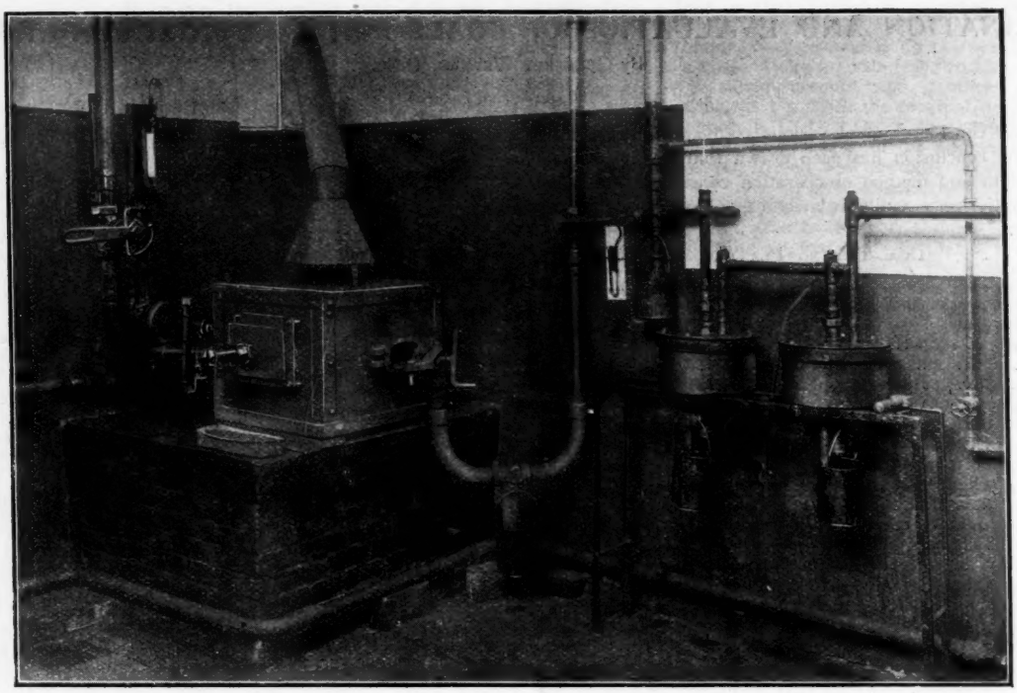


FIG. 2.—$\frac{1}{1000}$-TON COAL TESTING PLANT.

with an asbestos washer round the rim. On the outside of the door are cast two studs which loosely fit into two holes in the cast-iron bracket which hinges by loose pins passing through lugs cast on either side of the retort. A screw lever-pin passing through the centre of the bracket forces the door up against the end of the retort. To open, it is only necessary to knock out one of the hinge pins and swing the door back on the other hinge after unscrewing the lever. The analyses of the gas obtained show that this door is tight against the small vacuum and pressure which exist at different times inside the retort.

The side offtake pipe leads the gas down to the first tar drain pot sealed in water, and thence by a 1½-in. pipe up through a stop valve and about 5 ft. of atmospheric condenser to the top of a downcoming water-jacketed condenser pipe to another tar drain pot. The gas then passes to the first of two miniature Livesey washers made out of old cast-iron caps 12 in. in diameter. Each of these washers drains to a separate pot. The first is primarily intended to remove tar fog; the second contains dilute acid to remove ammonia. The gas then passes to small oxide purifiers (fig. 3), of which two are used in series of the ordinary works type containing bog iron ore. Following the purifiers are the meter and gasholders. At each quarter division of the meter dial is placed a metal bush or contact, so that the meter hand electrically connected to a dry battery makes a contact every quarter revolution, and the current causes an electro magnet to pull off and let fall a pen whereby a dot is registered on the paper of a drum revolving once an hour. Thus the rate of gas evolution is recorded, and provides the data for this factor in the evaluation. The gas is collected in a 20-c.ft. holder in which the measurement can again be checked, and is passed at the conclusion of each charge to a second similar holder, ensuring mixing, and releasing the first holder for the next charge. The gasholder bells are counter-

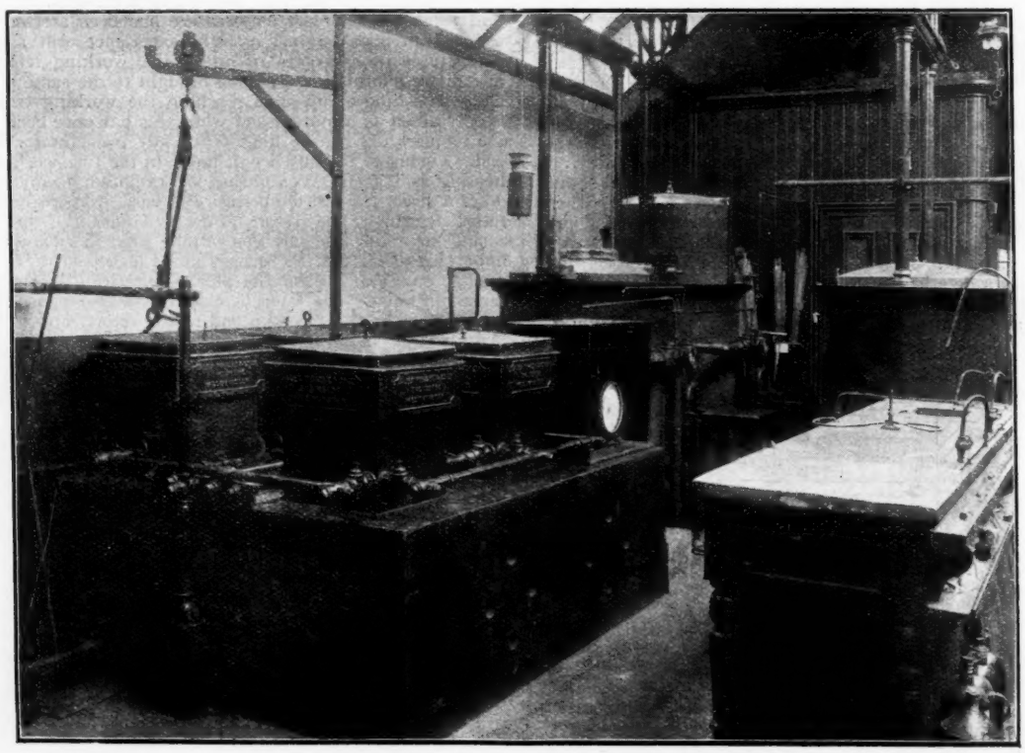


FIG. 3.—THE PURIFIERS AND HOLDERS.

balanced by weights, and used to create an exhaust on the plant. A more easily adjustable water-balanced holder would be of greater convenience.

One of the great difficulties of this type of plant has always been the large amount of dead space. This means that the gas from a previous charge is to some extent mixed with the actual charge being carbonized. In the plant now described the dead space has been considerably reduced, and it has been suggested that liquid purification would still further help, by displacing the purifiers which now contain a large proportion of the dead space. Most of the liquid purifying agents remove carbon dioxide as well as hydrogen sulphide; and in view of the effect of carbon dioxide on some of the physical properties of coal gas as a whole, it was felt perhaps safer to retain the oxide purification and avoid any corrections to bring the quality of the gas on a par with that made in works practice. It may, however, be possible in the future to use some special preparation of iron oxide as a suspension in water, for purification from hydrogen sulphide only.

METHOD OF OPERATION FOR ROUTINE TESTS.

The retort is adjusted to a uniform temperature of 1050° C. The tar and liquor drain pots are swilled round with clean water, and sufficient water is placed in to seal the dip pipe. The second washer is filled with weak acid to give about one-tenth seal, and the first washer with water. The purifiers are arranged as required. The coal sample, which is best obtained by the hammer and shovel method, or at least should not have been passed through a machine or broken down other than by tapping the large pieces with a hammer, so as not to make any more dust than is general to the bulk of coal, is placed on a ½-in. mesh screen, and very gently agitated. The lumps not passing through are carefully reduced by tapping, and the whole sample is mixed, and weighed out on to the iron pans. The gasholder is counterbalanced to cause a tenth of an inch W.G. vacuum at the stop valve, which is shut. The meter index is read. The coal charge of 2·24 lbs. weighed on to a shallow iron tray is quickly pushed to the far end of the retort, which is shut and clamped up. The stop valve is immediately opened, and the time recorder started. The vacuum is watched for a few minutes; and if a sudden rush of gas causes the pressure to mount up to two-tenths pressure, the holder weights are temporarily adjusted to keep as near to level gauge as possible. The temperature of the condensers is regulated so that the gas enters the "washers" at about 65° Fahr., and the meter at 60° Fahr. Very little trouble is required to ensure that the gas volume need be corrected only for atmospheric pressure. When 13 c.ft. (corrected) has passed the meter, the stop valve is closed and the charge withdrawn, quenched with 50 c.c. of water, allowed to cool, and weighed. The meter is read, and the time record removed. If 13 c.ft. are not evolved within 40 minutes, the charge is stopped at this point, whatever the gas yield may be. The gas is transferred to another holder, and the second and third charges are introduced and carbonized in exactly the same way, and without alteration to the seal pots and washers. The gas from the first charge is discarded as containing dead gas from previous working. The calorific value of the gas from the second and third charges is taken, and should agree within 10 B.Th.U. of the last charge. The value of the third charge only is taken for the evaluation. If benzole is to be estimated, the gas is passed through charcoal or oil absorbent before the calorific value is taken. The gas should also be analyzed, especially if the calorific value does not lie between (say) 530 and 570 B.Th.U., in order to see what abnormal feature is present. The nitrogen figure should not exceed 2 p.ct. at the outside, and very careful working has resulted in only 0·5 p.ct. being found by the direct combustion method.

The cooled coke is weighed in the trays; and after any pieces required of a large size have been selected, the remainder is broken by tapping to about 1-in. cubes, and a sample taken for crushing-down for laboratory analysis. The rest is further broken very carefully so as to lie between screens of 1 in. and ½ in. mesh. A portion of 750 grammes is placed in a rotary breaker (after Hewson), and the machine is rotated for 100 revolutions at a speed of 30 r.p.m. The broken coke is removed from the apparatus—care being taken that no pieces remain on the angle irons—and thrown on to a ¼ in. mesh screen. The weight of the portion remaining on the screen expressed as a percentage of the weight taken gives a measure of the large coke. The remainder is counted as breeze. The coke may be further examined for sulphur, calorific value, ignition range, and so on, as required.

The tar and liquor drain pots are weighed with contents, and the total weight of tar and liquor is ascertained. The whole is poured into one container, shaken, and allowed to settle, when the liquor is removed as far as possible, measured, and weighed, and a portion taken for the estimation of ammonia. Sufficient tar should be left to distil for the water content and to determine the specific gravity; but for more extensive examination the tar must be collected from a larger number of charges.

The benzole can be very conveniently absorbed in active charcoal and removed again by steam; and the result has been found to agree very favourably with that obtained in practice from the same coal under the same conditions. The value of this can, of course, be included in the evaluation; but as, unfortunately, so few gas concerns are recovering benzole, this product is not included in the example following.

The results of a coal test can be very easily checked by weight and thermal balances; and systematic procedure in this respect is worth carrying out, for several reasons, not the least important of which is that information of carbonization as a process is gained which is not evident in large-scale working.

(To be continued.)

FORTHCOMING ENGAGEMENTS.

March 18.—MURDOCH LODGE No. 3480.—Installation meeting.
March 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1.
March 18.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at the Council House, Birmingham. Paper by W. McNaughton on "Recent Developments at the Stafford Road Gas-Works."
March 20.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Leeds.
March 23.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual general meeting at the Hotel Cecil.
March 24.—EVENING STAR LODGE No. 1719.—Installation meeting.
March 24.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Wellington Tube Works, Ltd., Great Bridge, 5 p.m.
March 26.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at Westminster Technical Institute.
March 30.—ILLUMINATING ENGINEERING SOCIETY.—Meeting.
April 2.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual spring meeting at Motherwell.
April 13.—NATIONAL GAS COUNCIL.—Meeting.
April 13.—FEDERATION OF GAS EMPLOYERS.—Meeting.
April 17.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Old Kent Road Works of the South Metropolitan Gas Company.
May 5.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual general meeting at the Hotel Cecil, under the presidency of the Rt. Hon. Sir Alfred Mond, Bart., M.P.
May 6.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring meeting at Ipswich.
May 6.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Spring general meeting at Dudley.
May 14.—"B.C.G.A." Conference at Buxton.
May 18.—"B.C.G.A." Conference at Wallasey.

INSTITUTION OF GAS ENGINEERS.

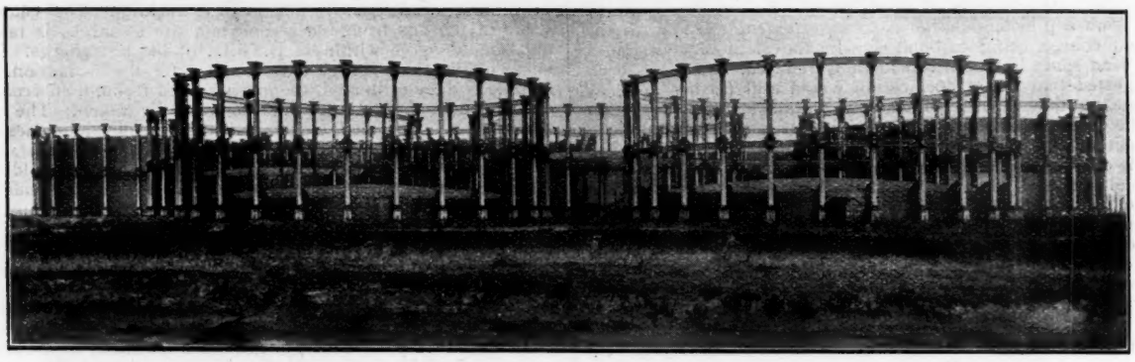
April 13.—Advisory Committee on Education.
April 14.—Emergency Committee, Finance Committee, Council.
May 11.—Advisory Committee on Education.
May 12.—Benevolent Fund, Finance Committee, Emergency Committee.
June 7.—Council.
June 8-10.—Annual Meeting.
June 11.—Visit to Hastings.

Commission Internationale de l'Eclairage.—From the Syndics of the Cambridge University Press we have received a copy of "Commission Internationale de l'Eclairage, Sixième Session." The price of the book is 15s. net.

Erratum.—In our report of the visit of the Manchester and District Junior Gas Association to the Crewe Works of the L.M. & S. Railway Company (*ante* p. 620) there was an error in the name of one of the speakers. Mr. *Millwood* should read Mr. *R. J. Milbourne* (Messrs. C. & W. Walker).

Woodall-Duckham Installation for Esbjerg.—The Esbjerg Town Council have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., of London, for a carbonizing plant having a daily capacity of 40 tons of coal. The plant will be complete with retort house, coal conveying plant, and waste-heat boiler. The coke being a product of primary importance, arrangements have been made by which the retort setting may be partially heated by means of coal gas.

EXTENSION OF A LARGE GASHOLDER AT THE BROMLEY-BY-BOW STATION OF THE GAS LIGHT AND COKE COMPANY.



GROUP OF GASHOLDERS BEFORE THE EXTENSION OF NO. 3.

In view of the call for increased storage capacity owing to the continued growth of the districts of large gas companies, and also of the present high cost of excavation and foundation work, the advisability of the extension of existing gasholders of big diameter, having sound brick or concrete tanks, is well worth considering—especially, as in this instance, where the original gasholder is of not more than two lifts, for the possibility of doubling the capacity without any further expense for tank and foundation work is very acceptable.

The gasholder in question is one of a group of nine, shown in the above illustration, all built by Messrs. Westwood & Wrights, Ltd., between the years 1871 and 1884, and all being of similar design, diameter, and depth—viz., 200 ft. diameter outer lift by about 35 ft. deep. The tanks, 203 ft. diameter by about 36 ft. 6 in. deep, were built by the late well-known firm of Messrs. John Aird & Sons, and are of very substantial design, with brick walls and concrete dumpling. The guide framing, as was the case in those days, consists of 28 ornamental, but substantial, cast-iron columns and two tiers of girders, the total height of the columns being approximately 78 ft. from the top of the tank coping.

Having in 1896 very successfully extended a gasholder of the same diameter and capacity, and of somewhat similar design, for the Nechells Works of the Birmingham Corporation Gas Department, then under the control of the late Mr. H. Hack, an illustration of which is to be seen in fig. 1, Messrs. Westwood & Wrights approached this proposition with every confidence. They, however, with the consent of Mr. T. Hardie, Chief Engineer of the Gas Light and Coke Company, put forward the idea in this instance of making the **extension of the columns and new girders in steel, camouflaged to match** as nearly as possible the existing cast-iron columns and framing; but in view of the additional strain which would be put on by the flying lift, three tiers of diagonal bracings were added.

The adoption of the spiral system for the flying lift was first carried out very successfully by Messrs. Westwood & Wrights on a two-lift gasholder, 124 ft. in diameter, at Rotherham, in 1893 (see fig. 2). This gasholder was also converted into a four lift; the guide framing being extended one tier, and the gasholder by two lifts. The top or flying lift was on the spiral system, as in the Bromley-by-Bow case (see fig. 4).

After careful examination of the existing cast-iron guide rails and chairs, it was decided by Mr. Hardie to have these replaced by new steel pressed chairs and steel tee guides. As an additional precaution, to meet the strains thrown by the top lift when rising, and to ensure stability until the third lift is in action, 28 sets of specially designed triple roller carriages were attached to the cup of the new second lift, working up specially constructed guides on the third lift.

In carrying out repairs and extensions to old gasholders, unexpected difficulties are often met with; and this case proved no exception. In fact, on opening-out the inner lift preparatory to making the working drawings, it was found that at some distant date the gasholder had been grounded, and the crown and internal framing pulled-in by vacuum. Some of the main tie rods, and even a number of the main bars, which are of plate girder section, were broken through, and the struts and ties very badly bent and damaged.

A further unexpected item was the general condition of the internal crown framing; this, contrary to the case with several gasholders repaired by the firm during the last few years, being very badly corroded. To such an extent had this proceeded that, before attempting to cut the main bars from the existing under-top curb, in order to shorten them to suit the reduced diameter of the new inner lift, it was necessary to prop them carefully, and repair and strengthen them one at a time—a very risky proposition, in view of the fact that the framing was already crippled by having been pulled in by vacuum, as before stated. These repairs were a long and tedious job, and very much prolonged the completion of the contract, as, until the crown framework was made quite satisfactory, it was impossible to proceed with the erection of the two new lifts. The existing box lattice vertical stays of the original inner lift were

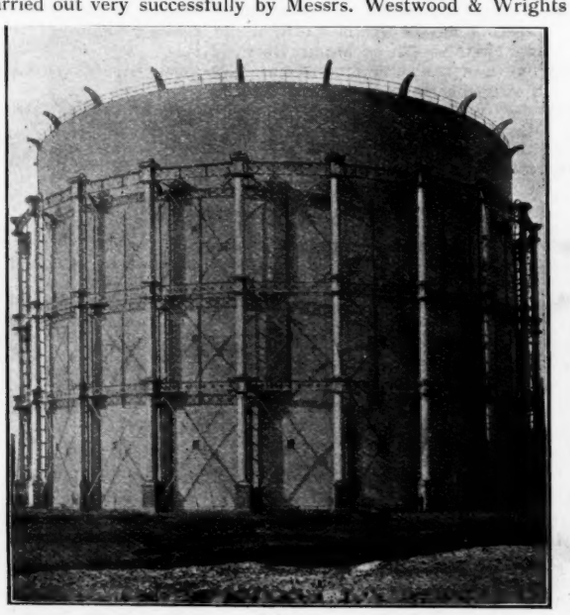


Fig. 1.—Two-Lift Gasholder. 200 ft. diameter, extended to Four Lifts in 1896 at the Nechells Works of the Birmingham Corporation.

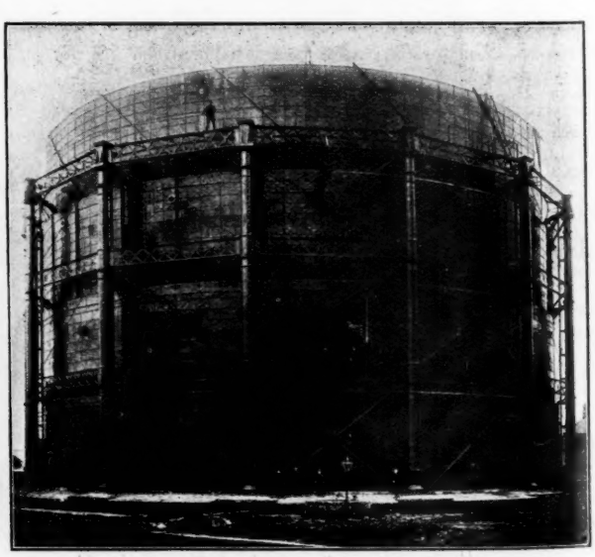


Fig. 2.—Two-Lift Gasholder, 124 ft. diameter, extended to Four Lifts, at Rotherham Gas-Works in 1893.

Fig. 3.—Group of Top Carriages to all Lifts.

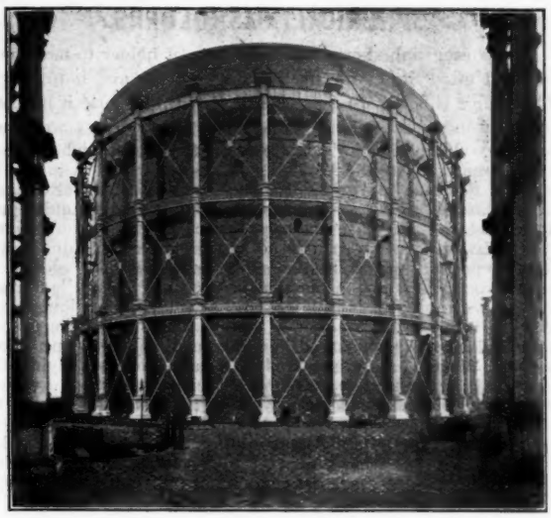


Fig. 4.—Close-up View of Completed Gasholder Inflated.

also found to be seriously weakened by corrosion of the top portion; and these had all to be removed, sent to the contractors' works for alteration, and about 12 ft. cut off and renewed before being re-erected in the new inner lift.

After the top framing had been very carefully propped and secured, the outer row of top plates was cut away to enable the outer end of the main bars to be dealt with. The main bars were then shortened, re-connected by new joint cover plates, and then put back into position on top of the under-curb, this under-curb having previously been sent to the contractors' works to be altered and re-swept to suit the reduced diameter of the proposed new inner lift. The intermediate main bars and diagonal purlins also had to be shortened to suit the reduced diameter of the proposed new inner lift; new tension rods being fitted to all half main bars. The broken main tie rods had to be repaired, and all 28 of them to be shortened; coupling boxes being inserted to assist in the necessary adjustment, owing to the original adjustment not being available. While these repairs were in progress, the construction of the two new lifts and new top curb for the inner lift proceeded at the contractors' works, also the removal of the dip plates of the existing cup and grip and the replacing of these by deeper plates to meet the increase of pressure thrown by the two extra lifts.

The repairs to the existing top framing, vertical stays, &c., to the two existing lifts having been completed, and the new top-curb, of 7 in. by 7 in. by $\frac{5}{8}$ in. angle, inserted, a new outer row of plates $\frac{5}{8}$-in. thick was fitted. The riveting-up was then completed, the main tie rods re-connected to the gusset plates, and the whole of the timber and other propping carefully removed from under the crown framing.

In the meantime the extension of the guide framing had also been proceeded with, the erection being carried out coincident with the renewal of the old cast-iron chairs and guide rails. In dealing with the extension of the guide framing, very careful and accurate measurements of the 28 column centres, and plumbings of same, had previously been taken; and from these the 28 lengths of new columns, and also the 28 new top girders and internal lateral circular girders, were constructed complete at the contractors' works. These particulars had been so accurately taken, and the manufacture so correctly carried out, that on erecting the columns and girders on the site, all the joints came into position as a dead fit, without any packing or re-drilling of a single hole. A neat and useful finish to the top girders was given by a double row of handrailing and standards.

After some consideration, Mr. Hardie decided to have the existing cast-iron caps replaced on the steel entablatures at the top of the new steel columns. It was first decided to cut away or perforate the webplate of the new top girders to approximate in appearance to the two lower tiers of cast-iron girders; but on further consideration this was reversed, and the web left solid, in order to maintain the full strength to support the whole structure firmly during the inflation of the flying lift.

The existing rest stones in the tank having been extended by the Gas Company, to receive the cups of the two new lifts, the old stones were levelled-up by the addition of steel plates of varying thicknesses. Fitting a new grip to the original inner lift sides, fixing the cup and plating of the new inner sides, and also lowering-in the complete new second lift was only a matter of general gasholder construction; and the repairs having been got out of the way, this new work was speedily completed, and the water started into the tank.

As soon as the tank was full, a few final adjustments were made to the internal top framing, and the gasholder was then closed, and air turned in to inflate it for testing, &c. As was confidently anticipated, the holder rose without the slightest hitch, riding perfectly level throughout with steady gauge; and as each lift cupped, the carriages, both internal and external, were carefully adjusted. The gasholder was then again lowered, inflated for the second time with air, and finally grounded for removal of rafts, &c. It was then sealed-up, and gas turned in.

The pressure thrown by the gasholder, as now extended, is about $14\frac{1}{2}$ in., as against the original pressure of $8\frac{1}{2}$ in.

The final photographs show the finished gasholder inflated (fig. 4), and the group of nine gasholders, with the reconstructed one inflated (fig. 5).

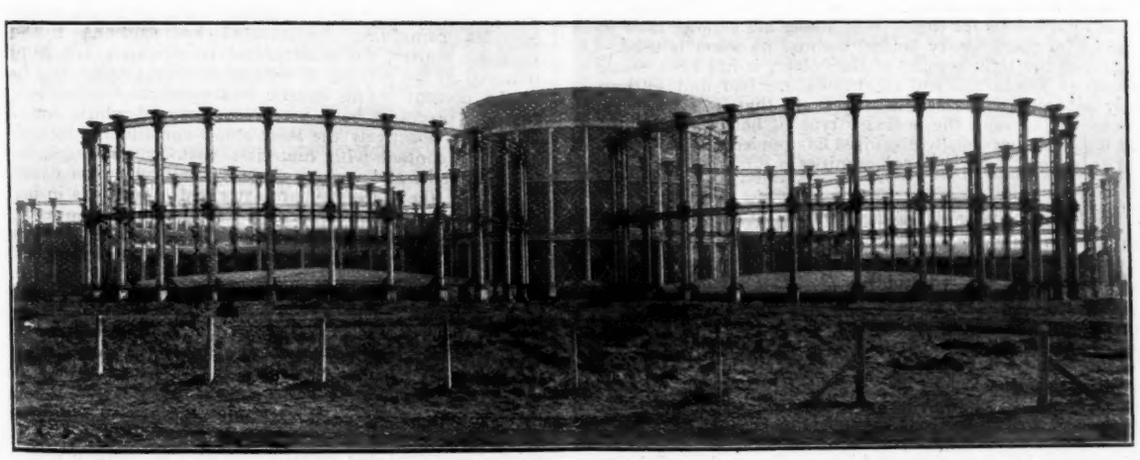
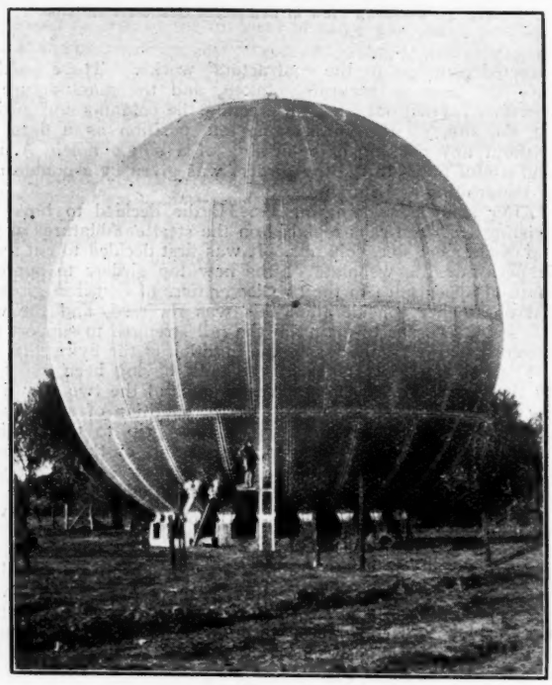


FIG. 5.—GROUP OF NINE GASHOLDERS, SHOWING RECONSTRUCTED ONE INFLATED.

SPHERICAL GASHOLDERS.

The photograph shows the latest type of holder to be adopted in the United States for the storage of town and natural gas. This shape is being used in several districts because it has been found in many cases to be the cheapest in first cost and maintenance, chiefly in outlying residential districts where rapid growth has rendered the existing mains too small to supply the present demand for gas. In such cases it has often been found possible to supply that section of the system under pressure, and thus increase the capacity of the mains. The new type of holder has shown itself to be very serviceable under such conditions, and avoids the necessity for laying new mains. In other cases this type of holder is used for "end" storage. Where a community is isolated, and at the end of a long main, it will use a certain amount of gas a day, though the greater part of this gas is consumed in a comparatively short peak load period. Without a storage holder, a compressor supplying this long main must be able to pump sufficient gas to take care of the maximum hourly demand. With a storage holder on the main, the compressor need be able to pump per hour only one twenty-fourth of the daily consumption. During hours of low consumption, the excess gas is pumped into the spherical holder until the demand exceeds the capacity of the compressor, whereupon the deficiency is supplied from the holder.



300,000 C.Ft. Horton Sphere.
Dia. 57 ft. 6 in.; working pressure 50 lbs.

The cost of the spherical holder for a given capacity is theoretically independent of the maximum pressure for which it is designed. If it is desired to have a capacity of 300,000 c.ft., for example, the cost is about the same for 50 lb. pressure as for 20 lb. The holder is a simple tank without cups, grips, rollers or other accessories.

The foundations for this type of holder are simpler than those required for the ordinary holder, because no water is used. On account of the light weight of the holder, it has been found of advantage where the soil conditions are bad and settling is likely to occur. Other advantages are that it is more easily accommodated than the ordinary type of holder; and the fact that it can be more easily disguised has rendered it more acceptable to several American communities.

Yorkshire Junior Gas Association.—A meeting of the Association will be held in the library of the Y.M.C.A., Leeds, on Saturday next, March 20, when Mr. F. Firth, of Leeds, will read a paper on "Meter Problems."

Modern Practice in an Aluminium Factory.—The current issue (No. 144) of "A Thousand-and-One Uses for Gas" deals with the practical side of the work of the aluminium founder, and contains a most interesting series of photographs taken in the foundries of Mr. Robert W. Coan, a pioneer in the art of aluminium casting. Mr. Coan relies almost entirely on town gas for all operations involving the application of heat, and is a firm believer in the use of this modern fuel for all work which has to be of consistently high quality, and carried out on a competitive basis.

BENZOLE AS A MOTOR SPIRIT.

Methods of Recovery of Benzole from Coal, the Properties of Benzole, and its Use as a Motor Fuel.

Summary of two lectures by W. H. Hoffert, M.A., B.Sc., Chief Chemist to the Joint Research Committee of the National Benzole Association and the University of Leeds, delivered at the University of Leeds, Friday, March 12.

The importance of the production of benzole in this country in relation to the motor fuel problem was briefly discussed.

The actual annual consumption of motor spirit in this country to-day is of the order of 500 million gallons. Figures were given showing that the quantity of benzole produced is only some 3 p.ct., while the potential production, if recovery of the benzole hydrocarbons from the gas was carried out at all gasworks and coke-ovens, would be about 12 to 14 p.ct. of this quantity.

It was pointed out, however, that any developments with a view to economizing our coal resources would materially increase the quantity of motor spirit actually produced from coal. If the hydrocarbons suitable for use in internal combustion engines, resulting from all the coal carbonized in this country, were recovered, the motor spirit obtained would go a long way towards supplying our present motor fuel requirements. In addition to the importance of benzole in being practically the only home-produced motor spirit, the benzole hydrocarbons are also used for other purposes—*e.g.*, synthetic chemicals, dyes, explosives, and as solvents.

Apart from the increase of motor spirit produced from coal as a result of developments indicated above, benzole production can be increased by improvements in methods of recovery, and by effecting any necessary refining with the minimum of loss and expense. The Joint Research Committee of the National Benzole Association and the University of Leeds, formed in 1921, have, up to the present, been chiefly engaged in examining the possibilities of improvements in these directions.

Both the methods of recovering the benzole hydrocarbons which are in use to-day, and those which are still in an experimental stage in this country, were outlined.

The oil washing process which has been used universally up to the present was described, and the essential properties of a good wash-oil discussed. On theoretical grounds, the absorptive capacity of a wash-oil was shown to depend on the mean molecular weight of the oil. The ideal oil would be one with the lowest molecular weight combined with a high boiling-point. The importance of using a wash-oil of low vapour pressure, low viscosity, and high stability was emphasized. Cresol and tetralin have recently been recommended as absorbents for benzole recovery. The vapour pressure curves of mixtures of benzene with cresol, tetralin, and other wash-oils as given in the literature were summarized, and the use of different wash-oils for benzole recovery discussed.

The possibilities of solid adsorbents such as active carbon, silica gel, and iron oxide gel were next examined, and the results of a systematic comparative examination in the laboratory of these adsorbents under benzole recovery conditions, carried out on behalf of the Joint Benzole Research Committee, were given. The solid adsorbent processes and the advantages and essential differences between them and the oil-washing process were briefly outlined. Whether these processes will be able to compete with the oil-washing process depends essentially on the stability of these adsorbents under working conditions.

The question was raised as to what refining is really necessary before the crude recovered benzole can be regarded as satisfactory as a motor fuel. The colour, the distillation range, the presence of unsaturated constituents, and the sulphur content of the benzole were discussed. Owing to the tendency of benzoles containing unsaturated hydrocarbons to produce resinous matter, the unsaturated constituents are completely removed in the process of refining with sulphuric acid used up to the present. This drastic treatment may be unnecessary. Refining processes have been recommended which are claimed to remove selectively the least stable constituents by polymerization in contact with materials such as silica gel, bauxite, fuller's earth, and various clays. The problem of conserving, if possible, the more stable unsaturated compounds in benzoles, but ensuring that the benzole is free from objection as a motor fuel is, however, a complicated one, and has been receiving the attention of the Joint Benzole Research Committee during the last two years.

The lectures concluded with a brief examination of the behaviour of benzole in motor engines in comparison with other motor spirits; and certain questions which are of interest to motorists were dealt with, such as air-fuel ratio, maximum power output, and fuel consumption. The results of Ricardo and others, showing that the tendency of a fuel to detonate is the one outstanding factor in determining its value for use in an internal combustion engine, were referred to, and it was pointed out that the chief advantages of benzole over petrol are due to its lesser tendency to detonate.

REPORT OF THE ROYAL COMMISSION ON THE COAL INDUSTRY.*

The Report of the Royal Commission on the Coal Industry became available to the public on Thursday, March 11. The purpose of this Commission, which was under the Chairmanship of the Rt. Hon. Sir Herbert L. Samuel, C.B.E., was to inquire into and report upon the economic position of the coal industry, and the conditions affecting it, and to make any recommendations for its improvement.

In addition to Sir Herbert Samuel, the members of the Commission were: General the Hon. Sir Herbert Alexander Lawrence, G.C.B., Sir William Henry Beveridge, K.C.B., and Mr. Kenneth Lee, LL.D. The Assessors to the Commission were the Rt. Hon. William Brace, Mr. A. E. Cutforth, F.C.A., Dr. Walcot Gibson, F.R.S., Major H. M. Hudspeth, D.S.O., M.C., and Dr. C. H. Lander, D.Sc.

PRESENT PROPOSALS.

Concerning the present problem, the five main conclusions which the Commission draw are:

There should be no more subsidy.

The present standard working day should not be altered.

If the present hours are retained, lower wages should be paid.

Meetings of owners and men, nationally and sectionally, should take place for the purpose of discussing wages.

The Government should assist in the transference of labour.

FUTURE OF THE INDUSTRY.

Regarding the future, the Commission state that:

There should be no nationalization of mines.

The State should acquire royalties by purchase where coal is proved, and in new fields by declaration as State property.

Benefits would accrue from the amalgamation of small mines.

There should be closer association of the mining, electricity, gas, and other allied industries.

A National Fuel and Power Committee should be formed.

The State should provide for research.

Selling agencies should be formed.

Local authorities should have the power to retail coal.

Profit sharing should be obligatory.

Later, annual holidays should be allowed with pay.

DEMAND.

The report is a very long one, running to 300 pages. The first part deals with the demand for, and utilization of, coal in a general manner. Regarding the foreign demand, the following figures are given as a comparison between the state of the industry before the war and in the last two years:

Million Tons.

—	1909-13.	1924.	1925.
Output of coal	269·59	267·12	244·42
Coal exported	88·37	81·75	68 97
Coal available for home consumption	181·22	185·37	175·45

These figures make clear—what indeed is generally well known—that it is the export rather than the home trade that is the cause of the present troubles. They state that the depression in the British coal export trade is in the main part of a general depression, affecting almost all European coal producing countries—an excess of supply over demand caused partly by the impoverishment of consumers, partly by the development of new coalfields, and partly by the increased use of subsidies. To a lesser extent, it is due to the competition of foreign countries, especially that of Germany. The extent to which the German export trade has been assisted by the Reparations provisions of the Treaty of Versailles is obscure. The conclusion is expressed that the British coal trade in general does not regard them as a serious danger. The substantial fall in British export prices during the latter part of 1925 has been followed by an appreciable recovery of the position in some, though not all, of the competitive markets; and the fall in price has been checked by a restoration of the balance between demand and supply.

It is stated that, in so far as the decrease in coal used as foreign bunkers is the natural consequence of the decrease in the export trade, it is obvious the quantity will automatically increase if the export trade increases. But in so far as it is due to the use of oil instead of coal, the reduction is likely to be progressive, especially if any change in the present relative positions of coal and oil as regards price takes place to the disadvantage of coal.

No substantial recovery in the home trade can be looked for except from a recovery of the heavy industries.

COAL RESERVES OF THE UNITED KINGDOM.

Regarding this important question, the view is put forward that, if the present rate of output remains fairly constant, and the working of levels deeper than 4000 ft. does not become possible, the coal at present known to exist in the United Kingdom will last for between four and five centuries. If, on the other hand, account is also taken of probable and possible reserves, there should be enough to last for about seven centuries. If it should prove possible to work coal from levels below 4000 ft., or if new coal fields are discovered in areas previously untried, as was recently the case in Kent, there would be a corresponding extension in the duration of our resources. There would be a further extension if fresh means were found of utilizing the small coal which is now so extensively wasted.

> To estimate the relative weight of these factors is impossible. It is, of course, essential to exercise every economy in the utilization of coal, so as to reduce to a minimum the waste of the energy which it contains, and to exercise economy in the methods of working coal, so as to avoid losses due to water-logging and similar natural causes; but the general conclusion is indicated that it is unnecessary to contemplate any restriction upon the production of coal, other than that which results from the general economic conditions of the time.

UTILIZATION.

Briefly stated, the problem of coal utilization is how best to convey the energy embodied in it to the spot where it is needed, and in the form in which it can be most effectively employed. In this connection, the report considers at some length the pretreatment of coal, and mentions the development of the coke oven and the gas industries. With regard to the former, the capital engaged is now in the neighbourhood of £40,000,000, and the industry possesses over 150 plants. In the gas industry the capital is £100,000,000—not very far short of that of the mining industry itself. In 1924 the coke oven industry carbonized nearly 19 million tons of coal, and the gas industry about 18 millions. Altogether, then, about 37,000,000 tons of coal were pretreated by carbonization; and coke equivalent to rather over 4 million tons of this coal was exported. During the same year, the amount of coal consumed in the raw state amounted to over 147 million tons; and the report, while stating that for some purposes it is doubtful whether it would be economical to carbonize the coal before burning it, definitely asserts that there is no doubt that a large proportion of the 147 million tons of coal at present burnt in the raw state is consumed most wastefully.

After paying considerable attention to the expense and ill-health resulting from smoke-polluted air, the report next deals with the supply of oil from coal. The Commissioners state that it is a matter of prime importance to the nation that methods of treatment of coal before burning, such as have already been adopted with respect to one-fifth of the coal by the gas and coke oven industries, should be applied to the other four-fifths.

LOW-TEMPERATURE CARBONIZATION.

The report goes on to state that methods which have attracted most attention in this country have been those known as low-temperature carbonizing processes. From a memorandum furnished by Dr. C. H. Lander, who is Director of Fuel Research to the Department of Scientific and Industrial Research, and, as has been mentioned, was one of the Assessors to the Commission, the following paragraph is quoted:

> By low-temperature carbonization is understood the destructive distillation of coal at temperatures round about 600° C., instead of at the higher temperatures of 1000° C. and upwards used in the gas and coke-oven industries. At the higher temperatures more of the coal is converted into gas and less into tar and coke, while from suitable coal a stronger coke is left behind; incidentally, the yield of ammonia is also much greater. At the lower temperatures enough combustible volatiles are retained in the coke to enable it to catch fire and burn readily, though not enough to generate smoke. Large quantities of tar are collected without being decomposed into gas, while both from the gas itself and from the tar some light spirit can be extracted and converted into motor spirit. Low-temperature carbonization accordingly offers a possible means of so treating coal as to obtain at once a source of oil fuel and motor spirit, and a solid smokeless fuel that can be burned on any domestic grate.

The Commission gave close attention to the question of low-temperature carbonization, but they could find no evidence that the system has yet been anywhere established on a commercial scale for a period sufficiently long to enable the claims that are made on its behalf to be fully tested. They recommend, however, that the Government should give sympathetic consideration to any proposals of the Fuel Research Board for the further investigation of the process on a commercial scale. On this point we quote the following:

> One of the methods by which the State could most effectively promote these developments would be to offer to the producers of smokeless semi-coke an assured market, so soon as the production had been established on a commercial scale and a fuel was provided that possessed a heating value not less in relation to its price than that of the coals now bought. Such a market could be found, at all events at the outset, in the Government's own purchases. These are on a large scale. The Office of Works

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buys over 250,000 tons of coal a year; the Admiralty 350,000 tons for dockyards and other shore establishments, apart from about an equal quantity of Welsh steam coal for Your Majesty's ships; the War Office over 300,000 tons. In the total, nearly 1,000,000 tons a year are purchased by these Government Departments, not including the requirements of the Navy itself. If and when the Fuel Research Board is able to report that a smokeless semi-coke is available, fulfilling the condition that we have mentioned as to price in relation to heating value, and in other respects as suitable as raw coal, we are of opinion that, in view of the important national interests that are involved, the Departments concerned should be instructed by the Government to purchase the semi-coke in preference; and in order that producers may be encouraged to proceed with the enterprise, we recommend that an announcement should now be made that this will be done.

An assured market for the oil is equally important. The oil produced from low-temperature tar differs in some of its properties from natural oils. The small quantities so far produced have been readily disposed of for special purposes, mostly for purposes other than fuel. Government Departments, and notably the Admiralty, could assist by giving preference to home produced oils. We are informed that the Mines Department has already been in correspondence with the Admiralty on this subject, and has received the following assurance: "The Admiralty would certainly examine very carefully and sympathetically the question whether the oils produced in this country are suitable for their purposes, and would undertake to test any samples submitted, and to offer advice with a view to the production of oils suitable for meeting Naval requirements. In the event of suitable grades of oil being produced in satisfactory quantities and at reasonable prices, the Admiralty would be prepared to buy them in preference to oils of foreign origin."

Similarly, the War Office and the Air Ministry have informed the Mines Department that they "will certainly examine very carefully and sympathetically the question whether the oils produced in this country are suitable for their purposes and, if they are, will buy them in preference to imported oils if they can get at least equal value for their money."

Brief mention is also made of the use of pulverized and colloidal fuel; and it is suggested that room exists for further investigation as to the possibilities of the extended employment of these two forms of fuel in this country.

Co-ordination of Coal-Using Industries.

The report then goes on to consider the wide question of the co-ordination of the various coal-using industries. This important subject, it is stated, is not one of a simple choice between one or two alternative methods, such as burning raw coal to produce steam power on the one hand, or to produce electricity on the other, but of the balancing of a variety of factors, and often of a combination of possible processes. It has been strongly impressed upon the Commission, as the outcome of their inquiries, that it is an error to suppose that the only, or even the principal, object to be aimed at in this connection is the most economical method of producing electricity. The object to be aimed at is the most economical and efficient way of utilizing the energy embodied in the coal. The question is not, as has so often popularly been supposed, the co-ordination of two industries—coal and electricity—but of several, such as gas, chemical products, coke ovens, and oil. It is emphasized that no obstacle, whether of State regulation or industrial organization, should be placed in the way of development of such combinations in whatever manner engineering and chemical skill and the economic conditions may indicate as the most suitable. Concerning the formation of a National Fuel and Power Committee, we quote the following:

National Supervisory Body.

In a memorandum prepared by Dr. Lander, it is stated that "no comprehensive survey has ever been made of the heat, light, and power requirements of various industries or of the country as a whole, and how they can be most economically met by the various processes at present commercially feasible; still less has the broad question been considered from the point of view of possible development in the future." We consider that such a survey is imperatively required in the national interest. But we hold the view that it is not a matter on which a single investigation, undertaken at a particular time, would be likely to furnish the most fruitful results. The problems to be dealt with are so diverse, and the sciences and practices that are concerned are in a state of such active development, that the survey which is needed should rather be a continuous process, undertaken by a body of a permanent character.

So far as electricity is concerned, a valuable method of securing the effective treatment of its special problems and interests has been adopted through the appointment of an Electricity Commission. We shall find it necessary to recommend the appointment of a body of Coal Commissioners. The gas industry has organized its own Gas Council, which represents both the municipal authorities and the commercial companies that are engaged in it. These various bodies would cover much the greater part of the activities which it is desirable to co-ordinate. We have not had the opportunity of taking evidence on this point from the Electricity Commissioners or the Gas Council, or the other bodies concerned. We therefore abstain from making any definite recommendation. But we venture to suggest for consideration the formation of a Standing Conference, composed, perhaps, of the Chairman and other representatives of the three bodies we have mentioned. In the case of coal, the Secretary for Mines might find it preferable, however, to choose some representative who was not the Chairman or a member of the Coal Commission. There might be included also representatives of the oil interest, and of the coking and bye-products and the chemical industries. This body, under some such title as the National Fuel and Power Committee, would exercise functions that would be advisory and not executive. Its primary task would be to ensure that, while a healthy competition should be maintained, where it was legitimate, between these various interests, their energies should be developed in a manner complementary, in the main, to each other; and that the actions of the State and of local authorities should be guided by a survey which would be comprehensive and not one-sided. Such a committee would doubtless keep in close touch with the Department of Scientific and Industrial Research.

It might perhaps be found desirable to add to its membership representatives of the Association of Municipal Corporations and of the County Councils Association, since important questions relating to Local Government areas and the powers of their authorities arise in this connection. These areas, the outcome of their historical origins, suitable as they no doubt are for most of the purposes with which they are concerned, do not necessarily correspond with the areas which should be adopted when schemes relating to fuel and power are in question. The adjustments necessary in particular cases could be advantageously considered under the auspices of a central body such as that which we suggest.

Research.

The Commission advocate extensive research; and according to their proposals there will be three large organizations, each dealing with one aspect of the coal problem. The Colliery Owners' Research Association will be concerned with coal winning, the Safety in Mines Research Board will deal with safety, and the Fuel Research Division of the Department of Scientific and Industrial Research will consider the problems of utilization.

No Nationalization.

Part 2 of the Report deals with the organization of the industry. The Commission do not recommend the adoption of the policy of nationalization of mines, for they are not satisfied that any scheme proposed to them is workable, or that it offers a clear social gain. Indeed, they perceive in nationalization grave economic dangers, and can discover no advantages which cannot be obtained as readily or more readily in other ways. Consequently they contemplate the continuance of the industry under private enterprise.

Ownership of the Mineral.

One of the chief recommendations on the subject of reorganization of the industry is that the mineral should be acquired by the State—by purchase where it has a market value; by a declaration of State ownership in the case of unproved coal, or coal at deep levels, which has now no market value. The coal in existing mines which are likely soon to cease working, and coal which is not now worked and is not likely to be developed in the future, should be excluded from the purchase. They emphasize that safeguards should be adopted against any excessive compensation claims, and suggest that a Coal Commission should be appointed, under the authority of the Secretary for Mines, to acquire and administer the mineral property.

Amalgamations of Existing Mines.

The amalgamation of many of the present small units of production, it is stated, is both desirable and practicable.

This may often be effected from within, but in many cases it will only take place if outside assistance is given. Any general measure of compulsory amalgamation, on arbitrary lines, would be mischievous. The action to be taken should be elastic, and should enable each case to be treated individually. The State as mineral owner will be able to promote desirable amalgamations when granting new leases or renewing old ones. Legislation should provide for a compulsory transfer of interests under existing leases where desirable amalgamations are prevented by the dissent of some of the parties or their unreasonable claims. Existing leases would not otherwise be affected.

Distribution.

The Commission state that the industry as a whole has so far failed to realize the benefits to be obtained by co-operation. Much financial advantage, it is suggested, might be gained by the formation, in particular, of co-operative selling agencies. These are specially needed in the export trade. The Government should consider the establishment of an official system for the sampling and analysis of coal, with the view of encouraging selling on specification and guarantee, in both the home and the foreign markets. Regarding this subject, the following is quoted from the report:

The preparation of coal for the market is becoming of increasing importance. The high price of coal now ruling makes the purchaser more particular as to the quality supplied; and this is especially the case with overseas buyers. Connected with this is the question of buying coal under a guarantee as to quality, or at a price depending on some ascertainable characteristic, such as ash content or calorific value. Increased attention to these points is being paid in continental coalfields; and this undoubtedly in some cases gives them an advantage over British coals, even though their coal intrinsically is of lower value.

A uniform quality may be important to the consumer, and he may prefer a coal on the characteristics of which he can depend to a coal of possibly higher, but varying, quality.

The methods to be adopted in grading and cleaning coal must

necessarily depend upon the circumstances of each pit, and the purpose for which the coal is to be used. We consider that increased attention should be paid to these points by the industry, and that the study of methods of cleaning, grading, sizing, and blending coal is one of the most important of the duties which should be undertaken by the organizations for research.

More careful preparation makes possible the sale of coal to a specification, and this should have a beneficial effect upon the export trade, and, indeed, upon the coal trade generally, assuming that the specifications are reasonable, and confined to essential points. Any rigid specification of non-essentials cannot be beneficial, and may be harmful.

We feel that it would be of considerable benefit in many cases if the producers and dealers in coal were to state the broad specifications for the coal which they were prepared to supply. Were this practice generally adopted, it would ultimately lead to the special value of individual seams for particular purposes being adequately realized.

Where coal of a certain quality is specified, however, and the coal is sold under a guarantee, disputes as to the quality actually supplied are likely to arise, and have arisen in the past, particularly with foreign buyers. It is by no means easy to obtain a fair sample of a large consignment of coal, such as a cargo, and no independent authority for taking such samples exists in this country.

If it were possible to establish a public authority which should perform the duty of sampling, to be followed by analysis of cargoes of coal at the ports (a suitable plant for the purpose being provided at each port), and if that authority were approved by foreign buyers, and its operations conducted by methods internationally agreed, considerable advantages would ensue. Many disputes would be avoided. The double sampling and analysis which is now frequent, first on behalf of the seller in this country and then of the buyer abroad, would be eliminated. We suggest for consideration that inquiries should be made on this point in the principal countries which import British coals, and that, if the plan should be approved in principle, a Technical Conference should be summoned of an international character, to put it into definite form. The initiative might properly be held to devolve upon Great Britain, as the principal coal producing country in Europe.

Another proposal put forward is that local authorities should be empowered to engage in the retail sale of coal.

(To be continued.)

GOVERNMENT ELECTRICITY BILL.

Digest of the Clauses.

At the end of last week the Bill to amend the law with respect to the supply of electricity was published. It has been presented to the House by Col. Ashley, the Minister of Transport, supported by Col. Moore-Brabazon, Mr. Attorney-General, Secretary Sir Laming Worthington-Evans, Sir Philip Cunliffe-Lister, and Col. Sir John Gilmour.

CONSTITUTION AND GENERAL POWERS OF CENTRAL ELECTRICITY BOARD.

The first clause deals with the constitution of the Central Electricity Board. This is to be established as soon as may be after the passing of the Act, and is to consist of a Chairman and seven members appointed by the Minister of Transport. It is to be a body corporate with power to hold land without licence in mortmain. A person appointed to be the Chairman, or to be a member of the Board, is to hold office for such a term, but not less than five years, as may be determined by the Minister before his appointment. The Board are to appoint a Secretary and other officers and servants as may be determined. Provision is made for the payment of salaries, fees, allowances, pensions, and gratuities, such as the Board may determine. These are to be paid out of a fund to be established, and any expenses incurred by the Board are to be defrayed out of the same fund.

Regarding the general powers and duties of the Board (Clause 2), they are to be charged with the duty of supplying electricity to authorized undertakers in accordance with the provisions of the Act, but shall not (save as expressly provided) themselves generate electricity. With the approval of the Electricity Commissioners, the Board may enter into arrangements with any authorized undertakers, or other bodies, for the exercise by them on behalf of the Board of any of the powers under the Act which the Board may think can more expediently be exercised locally.

TECHNICAL COMMITTEES.

Under Clause 3 the Board are to appoint one or more consultative technical committees consisting of engineers employed in connection with generating stations which are by virtue of the Act for the time being selected stations. A consultative technical committee is to give advice and assistance on such matters as may be referred to the committee by the Board; and for that purpose the committee shall meet from time to time as the Board determine.

PROVISIONS OF THE SCHEME.

Clause 4 deals with the preparation and the carrying out of a scheme. As soon as practicable, the Board are to prepare and submit to the Electricity Commissioners a scheme—

(*a*) determining what generating stations (whether existing stations or new stations) shall be the stations (in this Act referred to as selected stations) at which electricity shall be generated for the purposes of the Board;

(*b*) providing for interconnection, by means of main transmission lines to be constructed or acquired by the Board, of selected stations with one another and with the systems of authorized undertakers;

(*c*) providing for such standardization of frequency as may be essential to the carrying out of the proposals for such interconnection as aforesaid;

(*d*) enabling or requiring temporary arrangements (to be in force during the carrying out of the scheme) to be made between the Board and owners of generating stations (whether authorized undertakers or not) with respect to the giving and taking to and by the Board of supplies of electricity, and with respect to the working of generating stations (whether selected stations or not) by the owners thereof, upon such terms as in default of agreement may be determined by the Electricity Commissioners;

(*e*) containing such supplemental, incidental, and consequential provisions as may appear necessary or expedient for any of the purposes aforesaid.

It is provided that a private generating station shall not, without the consent of the owners, be included in the scheme as a selected station, nor shall owners of such a station be required to enter into any temporary arrangement under the scheme. There is also provision for the publication of the scheme, and to give to authorized undertakings and other persons an opportunity to appear before the Commissioners for the purpose of making representations thereon. As soon as the scheme has been confirmed by the Electricity Commissioners, it is to be the duty of the Board to carry out and give effect to it.

EXISTING SELECTED STATIONS.

Clause 5 provides for arrangements being made by the Board with the owners of existing generating stations which are to become selected stations, and for such extensions and alterations as may be required by or under the scheme. Should the owners of any such station consider that any directions of the Board requiring additional extensions or alterations are unreasonable, they are to have the right of appeal to the Electricity Commissioners, with a further appeal if necessary to the Railway and Canal Commission. Furthermore, if the owners of any such station are unwilling to enter into, or fail to carry out, any arrangement to the satisfaction of the Board, the latter shall be entitled to acquire the station at a price to be determined in accordance with the provisions of the first schedule to the Act, and on payment or tender of the price, the Minister of Transport may make an order vesting the station in the Board.

NEW SELECTED STATIONS.

In Clause 6 power is given to the Board to make arrangements with any authorized undertakers, or with any company or person not being authorized undertakers, for the provision of new stations as required for the scheme. If the Board are unable to enter into an arrangement with any authorized undertakers, company, or person for the provision of new stations on reasonable terms, and can so satisfy the Electricity Commissioners, the latter may by a Special Order under Section 26 of the Electricity Supply Act, 1919, authorize the Board to provide the station themselves. Where the Board themselves provide a new generating station, they may operate it themselves or make arrangements with any authorized undertakers, or other company or person, to do so; but this again is subject to the Board satisfying the Electricity Commissioners on the point.

OBLIGATION AND RIGHTS OF OWNERS OF SELECTED STATIONS.

(Clause 7) From a date to be fixed by the Board, the owners of a selected station are to be under the obligation to generate electricity, and operate the station in such manner as the Board may direct, and to sell to the Board all electricity generated at the station at such price as arranged under the terms of the Act. The owners of the station are to be entitled to be supplied by the Board from that station at a price as provided for in the Act, with such an amount of electricity as they may require for the purpose of their undertaking, but not exceeding the amount generated at the station. The price to be paid for electricity by the Board to the owners of a selected station is to be the cost of production, which shall be ascertained in accordance with the rules contained in the second schedule* to the Act.

*SECOND SCHEDULE.

RULES FOR DETERMINING COST OF PRODUCTION OF ELECTRICITY AT SELECTED STATIONS.

The cost of production of electricity at any selected station, shall

be ascertained by calculation the following costs, charges, and allowances for the year of account:

(*a*) The sums expended for fuel, oil, water, and stores consumed, for salaries and wages, and for repairs and maintenance.
(*b*) Sums paid as rents, rates, and taxes, other than taxes on profits, in respect of the station.
(*c*) The proper proportion of management and general establishment charges (including compensation for loss of office payable under this Act) attributable to the station.
(*d*) Interest (exclusive of interest payable out of capital) on capital properly expended and attributable to the generating station and the plant suitable to and used for the purpose of generating electricity thereon.
(*e*) An allowance for depreciation.

The price at which electricity is to be supplied by the Board from a selected station to the owners of that station shall be either—

(*a*) the cost of production ascertained in manner provided in the second schedule, adjusted according to load factor, together with a proper proportion of the Board's expenses other than those incurred by the Board in the purchase or generation of electricity; or
(*b*) according to the tariff fixed under this Act for the supply of electricity by the Board, whichever is the lower.

It is provided that, should any question between the Board and the owners of a selected station arise under this section, it is to be determined by the Electricity Commissioners.

Main Transmission Lines.

Clause 8 gives the Board power to construct and lay down the main transmission lines required for the interconnection of selected stations, and with the systems of authorized undertakers. It also provides for the acquisition for the Board of any main transmission lines belonging to authorized undertakers, and for their vesting in the Board, upon an order to that effect being made by the Minister of Transport.

Standardization of Frequency.

This important question is dealt with in Clause 9, which provides that the Board may require any authorized undertakers, or the owners of any selected station, to amend or alter the frequency employed in their undertaking, or station, if and so far as such amendment or alteration is required to effect the standardization of frequency provided by or under the scheme, or to effect such standardization of frequency as the Board, with the approval of the Electricity Commissioners, may think expedient, subject to the payment to the authorized undertakers or owners of any expenses which they may properly incur in carrying such requirements into effect (including the cost of altering or replacing plant belonging to consumers); and it shall be the duty of the undertakers or owners to comply with such requirements. The payment of these expenses is to be a purpose for which the Board may borrow under the Act, but such part of the revenue of the Board as is required to meet the interest on and sinking fund charges in respect of money so borrowed shall be excluded in any computation of receipts made in estimating for the purposes of rating the net annual value of hereditaments, or the yearly rent or value of lands and heritages in Scotland, occupied by the Board for the purposes of their undertaking.

Supply to Authorized Undertakings.

On the completion of a scheme (Clause 10) the Board are to be under an obligation to supply either directly or indirectly to any authorized undertakings in the area demanding a supply such an amount of electricity as they may require for their undertaking, at a price to be ascertained in accordance with the provision of the Act. To this provision is attached that the Board are not to—

(*a*) supply electricity directly to authorized undertakers situated in the area of supply of a power company without their consent, unless the undertakers have an absolute right of veto on any right of the power company to supply electricity within the area of supply of those undertakers;
(*b*) without the consent of the Electricity Commissioners the Board may supply electricity directly to any authorized undertakers in the district of a joint electricity authority which that authority are authorized to supply.

In this connection the Board are duly protected should it appear to them that the outlay incurred in providing transmission lines required for the supply to authorized undertakers would, having regard to the supply required, entail unreasonable expense on the Board. They may represent the case to the Electricity Commissioners, who may, if it seems to them to be just, authorize the Board to impose such terms and conditions as the Commissioners think fit, on the giving of the supply. The Board too may make it a condition of furnishing such a supply that the undertakers shall take the whole quantity of electricity required for their undertaking, directly or indirectly, from the Board. Where any authorized undertakers demand a supply from other undertakers who themselves receive a supply from the Board, the last-mentioned undertakers shall, if the Board so require, impose the like condition, provided that the Board shall not impose or require the imposition of such a condition unless satisfied that the cost per unit to the undertakers of taking the whole of their supply directly or indirectly from the Board will be less than the cost per unit at which electricity is being produced at the generating station of the undertakers; and in determining such cost of production no account is to be taken of interest or sinking fund charges in respect of capital expended on the station. Where the authorized undertakers feel aggrieved by the imposition of such a condition they may appeal to the Electricity Commissioners, whose decision is to be final.

Tariff for Electricity Supplied.

Subject to the provisions of the Act as to the sale of electricity to the owners of selected stations, the price to be charged by the Board for electricity supplied directly by them to authorized undertakers shall be in accordance with such tariff as may be fixed by the Board from time to time, and the tariff shall be fixed so that over a term of years to be approved by the Electricity Commissioners the receipts on income account shall be sufficient to cover the expenditure on income account, including interest and sinking fund charges, with such margin as the Electricity Commissioners may allow. The method by which the tariff is to be framed is defined.

Clause 12 deals with the price to be charged for indirect supply in bulk, and Clause 13 provides for a limitation on price to be charged to owners of selected stations. In this instance, the owners of a selected station who take a supply of electricity from the Board, who can prove to the satisfaction of the Electricity Commissioners that the cost of taking a supply from the Board on the terms provided by the Act in any year during the period of seven years from the date when they commence to take a supply exceeds the cost which they would have incurred, had this Act not been passed, in themselves generating the like quantity of electricity, then the charges by the Board to those undertakers for the supplies of electricity furnished to them shall be so adjusted that the amount charged in that year does not exceed the cost which the undertakers would have incurred in themselves generating the supply.

Abatement of Charges of Undertakers who Decline to Take a Supply from the Board.

Clause 14 is one against which some existing undertakings will, we think, show some hostility. By this, the Board may notify any authorized undertakers that they are in a position to supply directly or indirectly to them the whole quantity of electricity required for their undertaking on specified terms, and are satisfied that the cost of the supply on those terms is below the then prevailing cost to those undertakers, and they refuse, or within three months after the notification fail to agree to take such supply from the Board, then the Electricity Commissioners may by order require the authorized undertakers to make such abatement from the rates and charges for electricity for the ensuing year that the estimated aggregate amount of the abatements will be as near as may be equal to the amount of such excess. Such undertakers may not then increase their existing rates and charges without the consent of the Electricity Commissioners. In calculating, for the purposes of this section, the cost of production of electricity generated by the authorized undertakers, no account is to be taken of interest or sinking fund charges in respect of capital expended on the generating station.

Miscellaneous and Subsidiary Provisions.

Clause 15 deals with compensation for deprivation of employment. Clause 16 with the powers of authorized undertakings. Clause 17 refers to the necessity of obtaining certain consents. Clause 18 provides for the application of Electricity Supply Acts to the Board. Clause 19 deals with acquisition of land by the Board. Clause 20 refers to the power of the Board to use main transmission lines by agreement.

Purchase of Surplus Electricity.

By Clause 21, the Board and any company or person producing electricity by means of the utilization of water power, waste heat, or otherwise, may enter into arrangements for the purchase by the Board of any surplus electricity which the company or person may be able to dispose of on such terms as may be agreed, and the Board may be authorized by order of the Electricity Commissioners to exercise such powers, including the power to break up roads, railways, and tramways, as may be necessary for the purpose of conveying the electricity so purchased.

Financial Provisions.

In the next Clauses, commencing with No. 23, the financial arrangements are set out. All sums received by the Board are to be paid into a separate fund, out of which the salaries, fees, and allowances of the members of the Board, and the salaries, remuneration, pensions, and gratuities of the secretary, officers, and servants of the Board, and all expenses incurred by the Board, are to be paid. The next Clause deals with the power to borrow, which is to be with the consent of the Electricity Commissioners and subject to regulations to be made by the Minister of Transport with the approval of the Treasury. The money borrowed, and the interest thereon, are to be charged on the undertaking, and the revenues of the Board, or on any specific property forming part of the undertaking, and shall be repaid within such period not exceeding sixty years as the Electricity Commissioners may determine. The maximum amount which may be borrowed by the Board under this section is to be £33,500,000, and the Board are not to have power

to borrow in excess of that amount otherwise than for the purpose of paying off loans previously raised, unless authorized to do so by a Special Order under section 26 of the Electricity Supply Act, 1919. Provision is made for the repayment of money, also for suspension while the expenditure remains unremunerative for a period not exceeding five years from the commencement of the financial year next after that in which the expenditure was incurred. By Clause 25, the Board are authorized to issue stock; then in Clause 26 power is given to the Treasury to guarantee loans to the Board. This provides that, subject to the provisions of this section, the Treasury may guarantee in such manner as they think fit the payment of the interest and principal of any loan proposed to be raised by the Board or of either interest or the principal, provided that the aggregate amount of the loan, the principal or interest of which may be so guaranteed, shall not exceed £33,500,000. Any sums that may from time to time be required by the Treasury for fulfilling any guarantees given under this section are to be charged on and issued out of the Consolidated Fund of the United Kingdom or the growing produce thereof. The repayment to the Treasury of any sums so issued, together with interest at such rate as the Treasury may fix, is to be a charge on the undertaking and all the revenues of the Board next after the principal and interest of the guaranteed loan and any sinking fund payments for the repayment of the principal thereof, and in priority to any other charges not existing at the date on which the loan is raised.

The Treasury are to lay before both Houses of Parliament in every year within one month after March 31, a statement of the guarantees (if any) given during the year ended on that date, and an account up to that date of the total sums (if any) which have been either issued out of the Consolidated Fund under this section, or paid in or towards the repayment of any money so issued.

Other Provisions.

Passing on to Clause 28, this deals with charges for electricity supplied by power companies, and Clause 29 deals with the relation of charges to dividends of undertakings which are not power companies. Both these clauses are likely to give rise to considerable discussion in the electricity industry. Subsequent clauses deal with the scheme for the constitution of electricity districts and the organization of supply therein, also with power for the amendment of schemes and provisions as to companies with large areas of supply. Following there is one providing for terms of purchase of a company taking a bulk supply.

Charges to Ordinary Consumers.

Section 36 is one which will have interest for the administrators of gas undertakings. It refers to the methods of charge which may be made by authorized undertakers to ordinary consumers. It is as follows:

> The charge made by authorized undertakers to any ordinary consumer, may, if duly authorized, and notwithstanding anything in any Act or Order to the contrary, consist of a periodical fixed or service charge, and in addition a charge for the actual quantity of energy supplied to the consumer or for the electrical quantity contained in the supply.
>
> When the undertakers have power to provide meters, electric lines, fittings, and apparatus and appliances, the periodical fixed or service charge may include a rent, charge, or remuneration in respect of any meter and any electric lines, fittings, apparatus, and appliances provided by the undertakers in or upon the premises of the consumer, whether let on hire or hire purchase terms to the consumer, or otherwise.
>
> A method of charge as aforesaid may be authorized by Special Order or by an approval under the provisions of section 31 of the Schedule to the Electric Lighting (Clauses) Act, 1899, or corresponding provision contained in any Act or Order, and such Special Order or approval may provide, where expedient, for an option to ordinary consumers to be charged by an authorized alternative method.

There are no other clauses which it is necessary to summarize.

Schedules.

There are seven schedules to the Bill. The first deals with the provisions as to the acquisition of generating stations and main transmission lines. The second defines rules for determining the cost of production of electricity at selected stations. The third deals with authorized charges and allowances in respect of transmission lines used for giving bulk supply to authorized undertakers. The fourth supplies an adaptation of section 16 of the Electricity (Supply) Act, 1919, as amended by section 21 of the Electricity (Supply) Act, 1922. The fifth provides for amendments of Schedule to the Electric Lighting (Clauses) Act, 1899. The sixth prescribes minor amendments of the Electricity (Supply) Acts, 1882-1922. The seventh gives rules for determining the fixed charges component, and the running charges component.

New Thermometer for Temperatures up to 1800° Fahr.

In the course of a lecture delivered by Dr. E. R. Berry on the occasion of the presentation of the Grasselli medal by the American Section of the Society of Chemical Industry, the author described a thermometer similar to the familiar mercury instrument, but capable of registering temperatures up to 1800° Fahr. Gallium—hitherto regarded as a chemical curiosity—is the metal used. Apart from mercury, this has the lowest melting-point of all metals—viz., 29·7° C. When once liquefied, moreover, it will for long periods remain liquid—in a supercooled condition—at the ordinary temperature. The boiling-point is somewhere in the neighbourhood of 1700° C., which is much higher than that of mercury. It should therefore be serviceable as a thermometric liquid for use at high temperatures. Several gallium thermometers have been made recently in the Thomson Research Laboratory of the General Electric Company. Fused transparent silica is employed instead of glass. This can safely be heated to 1000° C.; and experiment has shown that one of the new thermometers can be kept for 24 hours at that temperature without detriment. The vapour pressure of the metal is so low that the thermometer does not require to be nitrogen-filled.

Initial Decomposition of Coal by Heat.

The value of the researches of M. J. Burgess and R. V. Wheeler into the initial decomposition of coal by heat is too well recognized by readers of the "Journal" to require much comment. Information as to the temperatures of decomposition of different coals, and as to the character of the products, has recently acquired an additional value in relation to certain industrial processes (for the cleaning of coal and for its carbonization) which involve a preliminary heating of the coal at a comparatively low temperature. The information is of value also in connection with recent researches on the extraction of coal with boiling solvents under high pressures—researches concerned mainly with the so-called "coking principle" of coal—where the suspicion has arisen that the extracts obtained may have been the result not only of solvent action, but of thermal decomposition. As regards British bituminous coals, the observations on the initial stages of thermal decomposition most frequently quoted are those of Burgess and Wheeler, relating to the distillation of Silkstone coal in a vacuum. Similar work has recently been carried out by these investigators on a Lancashire coking coal, and the results of the experiments are published in the February issue of "Fuel in Science and Practice." It is shown that, whereas the gases removed under vacuum up to 200° C. appeared to be occluded gases (being mainly the paraffin hydrocarbons), the character of the gases evolved between 270° and 300° C. pointed to their being the products of decomposition of the coal substance. Simultaneously with the appearance of these gaseous products of decomposition (mainly the oxides of carbon), traces of a reddish-brown oil were distilled at about 280° C. This temperature is regarded as the initial temperature of decomposition of the Lancashire coking coal.

Association of Special Libraries and Information Bureaux.—A business meeting at which it is proposed formally to inaugurate the Association of Special Libraries and Information Bureaux will be held at the Institution of Mechanical Engineers, Storey's Gate, S.W. 1, on Monday, March 29, 1926. All interested are cordially invited to attend. The Association is being formed to facilitate the co-ordination and systematic use of sources of information in science, industry, commerce, and public affairs generally; and when fully developed it will function as a clearing house for those wishing to get into touch with specialized knowledge. The Association's first activity is to be the compilation of a Directory of Special Libraries and Information Bureaux in the British Isles. No complete list exists at present, and the Directory should therefore prove a valuable book of reference. The work will be authoritative, and will indicate the sources where both scientific and non-scientific information may be obtained. The entries in the Directory are to be carefully annotated throughout. The whole movement is deeply indebted to the Carnegie United Kingdom Trustees, who, in addition to setting aside the sum of £1500 to assist the Association in the first two years of its work, have now generously undertaken to defray the cost of compiling the Directory. It is anticipated that something like a year will be occupied in collecting the necessary data. Those in touch with special sources of information, and willing to collaborate with the Association in building-up the Directory, are asked to communicate with the Organizing Secretary, 38, Bloomsbury Square, W.C. 1, from whom further information may be obtained. Two successful conferences have been held, at Hoddesdon (1924), and at Balliol College, Oxford (1925). The proceedings have been published, and copies can be obtained (price 7s. 6d. for the two reports) from the office of the Association.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

ANNUAL GENERAL MEETING.

The Annual General Meeting of the Association was held on Thursday last, in the Imperial Hotel, Temple Street, Birmingham, when the members present enjoyed an excellent afternoon's proceedings. At the outset, the chair was occupied by Mr. W. E. CATON, of Oxford, who subsequently gave place to the new President, Mr. F. C. BRIGGS, of Dudley. In addition to Mr. Briggs's Presidential Address, there was an informal discussion of a practical nature upon "Meter Repairs at Gas-Works," which was introduced by Mr. Harold Davies, of Chesterfield. The visitors present included Mr. W. M. Mason, the Manager of the "B.C.G.A.," and Mr. Westwood, the Chairman of the Town of Dudley Gas Light Company.

MINUTES CONFIRMED.

The HON. SECRETARY (Mr. T. Thornton, of Rowley Regis) read the minutes of the last meeting (which were confirmed), and notified the receipt of apologies for absence from certain Presidents, Secretaries, and members of kindred Associations.

NEW MEMBERS.

After a ballot, the following new members were declared unanimously elected:

Mr. Lawrence Spencer Adlington, of Worcester.
Mr. Charles Bernard Wallis, of Bridgnorth.

REPORT AND ACCOUNTS.—THE INSTITUTION BENEVOLENT FUND.

The forty-eighth annual report of the Committee and the accounts for the year ended Dec. 31 (including the Emergency Fund Account) were next presented. The report stated that the number of ordinary members on the books at the close of the year was 111.

Their adoption was moved by Mr. H. DAVIES (Chesterfield), and seconded by Mr. C. M. D. BELTON (Shrewsbury).

Mr J. FERGUSON BELL (Derby) said he would like to ask if it was the intention to contribute £10 10s. to the Benevolent Fund of the Institution of Gas Engineers. Most of the District Associations were now contributing, and he hoped the Midland Association would again do so. He could claim to know something of the beneficent work that the Benevolent Fund had done, and was doing; and he could confidently recommend it to the favourable consideration of the members. He saw from the balance-sheet that the Association were about £10 behind on the year, but he thought it was well worth being this much behind to contribute to so worthy a cause. Further, they had a substantial balance in hand.

The report and accounts were adopted, and it was resolved that the Association should subscribe £10 10s. to the Institution Benevolent Fund, as had been suggested by Mr. Bell.

COMMERCIAL ASSOCIATION.

Mr. B. W. SMITH (Walsall), as Chairman, submitted the report of the Committee of the Midland Commercial Gas Association for the year ended Dec. 31. He said that the membership was stationary at 58; and they were most anxious that other members should join this section. The balance-sheet was a very satisfactory one; and the usual four general meetings had been held during the year. Questions relating to coal and coke had been fully discussed. Figures with regard to coal, gas oil, coke, tar, and sulphate of ammonia, which might prove useful to the members, were included in the report. In various directions there were considerable fluctuations at the present moment; and it would be unwise to express any opinion as to the future.

Mr. W. H. ADAMS (Bilston) moved the adoption of the report. This was seconded by Mr. W. S. MORLAND (Gloucester), and agreed to.

REPRESENTATIVE ON INSTITUTION COUNCIL.

On the proposition of Mr. CATON, seconded by Mr. C. H. WEBB (Stourbridge), Mr. Briggs was appointed as the representative of the Association on the Council of the Institution of Gas Engineers.

THE NEW PRESIDENT.

Mr. CATON said his term of office as President was now at an end; but before leaving the chair, he desired to thank the officers and members for the loyal support given him since his appointment. He had done his best to carry out the duties satisfactorily; and he trusted he left the Association in, at any rate, as good a state as he found it when elected. It was with feelings of great pleasure that he asked Mr. Briggs to take the chair; and he hoped—indeed, he felt certain—that Mr. Briggs's year of office would be a successful one. Mr. Briggs was a very hard worker, and had always done his best to further the interests of the Association; and he was confident that the new President would do his utmost to uphold the dignity and prestige of the Association over whose affairs he was now called upon to preside.

Mr. F. C. BRIGGS, of Dudley, who was received with applause, said he had had an opportunity last October of thanking the members for the honour they had conferred upon him in electing him President. He would only say now that he hoped in twelve months' time they would not regret the choice they had made. He begged to move that the Association's best thanks be given to Mr. Caton, their retiring President, for his work during the past year. He could assure Mr. Caton,

Lafayette.

THE PRESIDENT.

Mr. F. C. Briggs, of Dudley.

on the members' behalf, that there was not the slightest doubt the Association was not worse, but was decidedly better, for his year of office and the energy he had put into its affairs. There were a good many types of men who went to make up the world. There was one type of man who, when he had a big task, did not sing about it, but got on with it. What he was doing was known only to those who were intimately acquainted with him. Mr. Caton was this type of man. He had had extreme difficulties to meet in Oxford, as his consumption had increased at such a rapid rate that he had been hard put to it to meet the demands. Naturally the consumption had increased in this manner because of the energy he had put into the undertaking. Mr. Caton was a man of ideas; they learned this when they visited Oxford. It was an education to see what he had done there. In his new works Mr. Caton had not "followed in the rut," as he (the speaker) had done, by putting in verticals, but had gone in for horizontal retorts. In a quiet, unassuming way Mr. Caton had done a lot of sound work for the Association. He had written numbers of letters to men who were not already members of the Association; and the joining of various newly-elected members had been entirely due to his efforts. Perhaps the Engineer who probably better than anybody else knew Mr. Caton, would second the vote.

Mr. J. FERGUSON BELL said he esteemed it a great privilege to be afforded an opportunity of seconding the vote of thanks to their retiring President, and of congratulating the new President on his appointment. As regards Mr. Caton, he could certainly claim some personal knowledge of him, because he had been associated with him (Mr. Bell) for several years at Derby. He had learned at that time a good deal about those abilities which Mr. Caton had displayed as President of the Association. He had given of his best to the Association, with the result that they had had a most successful year. The members would all remember the pleasant visit to Oxford last May, when, through the courtesy of Mr. Caton and his Directors, they were privileged to view the works and afterwards the beautiful old city. It was the opinion of everyone who had taken part in that inspection of the works that the Oxford Gas Company were to be congratulated upon having an Engineer of marked ability, who could erect works which were a credit not only to the Company who owned them, but to the city in which they were situated. They were greatly indebted to Mr. Caton for the energy and hard work he had put into his year of office. They thanked him for all he had done, and wished him many years of successful service to the Oxford Gas Company and also to the Midland Association. [Applause.]

Mr. CATON thanked the President and Mr. Bell for the kind terms in which they had moved and seconded the resolution, which, however, he hardly thought were altogether justified. He also thanked the members for the cordial and appreciative manner in which they had received the resolution. He had tried to do his best during his year of office, and was glad to know that his efforts had met with the approval of the members.

PRESIDENTIAL ADDRESS

Of Mr. F. C. Briggs, Assoc.M.Inst.C.E., A.M.I.Mech.E., A.M.I.Chem.E.

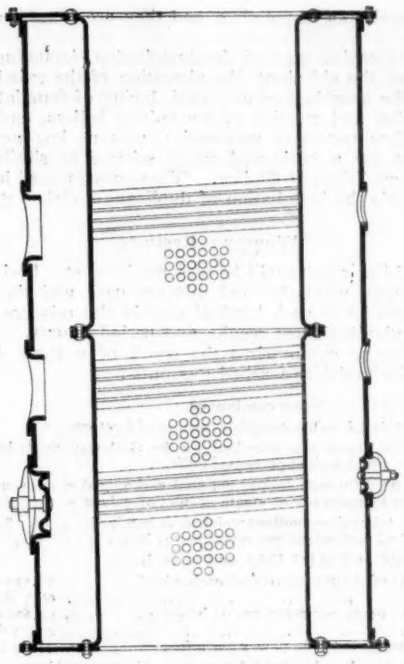
In conferring the honour of Presidency upon one of its members, the Association, as I see it, calls upon him to respond by giving without reserve an account of his stewardship of the undertaking under his direction, in order that it may learn the lesson of his failures and successes, and his outlook upon the current problems of the industry, in order that thought may be crystallized and an orientation given to opinion upon national policy. The practice of refraining from discussion on the Presidential Address is the Association's kindly acknowledgment of the speaker's sincerity; but it places, maybe, upon the President the obligation of a more thoughtful and candid address than would otherwise be the case. It is in such a spirit that I approach my task to-day.

In affairs of State, the Government may for political or even higher reasons have some costly social scheme very much at heart. But it also has a Chancellor of the Exchequer, who has to find the money; and dominating the whole is the permanent safeguard of the country's solvency, the Treasury, which, fortunately, often applies the brake. So, even in the protected industries, the financial position, particularly the cumulative effect of capital charges, must dominate the whole, and cannot be considered too carefully or too often. It must be the deciding factor as to the wisdom or otherwise of projected alterations, extensions, schemes. At Dudley, £1000 capitalized at the rate of a recent issue means 0·06d. per 1000 c.ft. on the price of gas for all time. £1000 charged to revenue equals 0·87d. per 1000 c.ft. on the price of gas for the year. To counteract an increase in price of this amount, the consumption must be increased in the year by approximately 3 p.ct. These facts, with the current price of gas, are very pertinent when considering simple hire, hire purchase, and free fitting schemes, which necessitate increased capital expenditure in some form or other. It is sometimes felt that many such, alluring as they are to the distribution side of every engineer, may be accumulating financial burdens which will be onerous in the future, particularly in times of national crises. An undertaking with low capital charges and what I may term elastic revenue charges is in a far better position to weather a storm than one with low and irreducible revenue charges but high capital charges. This matter is of increasing importance in view of the possibility of future keener electrical competition, which is present in the minds of all of us. But the competition may be double-edged in that the effect of Government assistance to our rival may increase the amount we have to pay for future money. As an example of the effect of this, if the recent small loan at Dudley of some £32,000 mentioned above can be renewed later at even 5 p.ct., the price of gas can be immediately reduced in Dudley by over ½d. per 1000 c.ft. It would need an increased make of gas throughout the year of over 1 therm per ton, without increased manufacturing costs, to produce the same effect, the work and difficulty of obtaining which every engineer will appreciate.

Progress, therefore, is a comparative term. What is progress in one case may be a retrograde step in another. The method depends upon the starting point and the problems to be faced. If I give you very briefly the position at Dudley immediately preceding the war, it is purely with a view to setting a starting-point from which progress may be measured, and setting out for the information of those who may have to face similar tasks how it was considered expedient to progress. The conservative policy by which Dudley had been guided in pre-war years needs, I feel, no apologia. Only in 1912 did the gas industry itself as a whole recognize the need for any organization, and then only tentatively on the selling side in the British Commercial Gas Association. It required a world catastrophe to emphasize the need and bring about the real organization of the whole industry in the National Gas Council and its kindred organizations.

The Dudley Gas Company's area covers Dudley borough only, and it has no country districts capable of development. In 1914 it had a sale of gas of 199 million c.ft. Its manufacturing plant consisted of inclined retorts and 10 ft. stop-ended, hand-stoked horizontal stand-by plant. Its purification plant was on standard lines, of adequate extent for the make of gas. Its geographical position was difficult, away from, and considerably above, the level of railways and canals. All coal and other haulage was by contract by horse and cart, which failed in times of heavy snow, and, of course, during the war. Its consumers consisted of 75 p.ct. slot meters, and the local population was largely working-class, very many being miners, with allowances of free coal. It was not, therefore, considered possible to sell many appliances such as gas fires. Electrical competition had caused the introduction of certain district facilities, such as simple hire for cookers, free fitting installations, &c. But its general organization was of a very conservative order, and did not comprise any adequate system for chemical testing, time checking, stores keeping, or district service.

One would fain draw a veil over the difficult position in which such an organization found itself during the war. Suffice to say, every effort was needed to maintain a supply of gas, and nothing could be done by way of reorganization. The war period left the Company with this task to face, and with capital charges amounting to 10·6d. per 1000 c.ft. The problem, therefore, appeared to be to refrain from adding capital expenditure, to reorganize the Company to deal with its consumers on more approved lines, to increase its consumption by service and propaganda, and so reduce its capital charges, and to meet the demand for increased gas out of revenue as far as possible by replacing plant with more efficient types, always keeping watch that the price of gas should not be unduly inflated, but should be regularly, if slowly, reduced. Necessarily, progress is slow and unspectacular.



Section of Galloway's Waste-Heat Boiler.

My Directors and myself hope to be honoured later in the year by a visit from the Association. I will, therefore, deal in the briefest terms with the present technical equipment which will then be under your inspection.

Gas-Making Plant.

The gas-making plant consists of:

(1) A dual Humphreys & Glasgow carburetted water gas installation of 600,000 c.ft. per day total nominal capacity on standard lines. The installation of the plant was made compulsory by war demands for gas; and as the subsidiary coal gas plant was working to capacity, it was installed as a complete unit with boilers, exhausters, purifiers, meter, &c.

(2) A Glover-West vertical retort plant. There are 16 retorts 40 in. by 10 in. at the top by 25 ft. long, with bottom steaming chambers, each of 5 tons per day nominal throughput. The actual average gas output capacity on mixed coals, allowing for scurfing, is approximately 5750 therms per day. There are four open-front producers, and the retorts are controlled in pairs. The whole of the machinery on the plant is steam-engine driven except for the stand-by extractor drive, which is by gas engine. The steam is supplied by two Galloway water-tube waste-heat boilers (as illustration), and normally there is a surplus of steam which passes by an automatic valve to the works. But if ever the plant steam pressure falls below that of the works boilers, whatever that may be at the moment, steam passes from the works to the plant, also automatically. When only one waste-heat boiler is in operation, steam has to be supplied to the plant by the general works boilers.

The cleaning of these boilers, operating upon hard town water, has been found to be a serious item of cost; and it is now proposed to instal a water-softening plant, which it is considered has become essential.

The coal and coke are handled by a lip-bucket conveyor. The coke is led by a chute to steel-framed brick outside hoppers arranged to permit direct loading of steam lorries. The coke is loaded over a round-bar screen with ⅞-in. spaces, and the breeze is automatically screened into three sizes—large, small, and dust. The average working percentages amount to: Coke 70 p.ct., large breeze 20 p.ct., small breeze 5 p.ct., and dust 5 p.ct. The small breeze and part of the large breeze are burned on the works boilers. The remainder of the large breeze is returned to the retort-house producers. For the dust, no useful purpose has yet been found.

The breeze screens are of the simple inclined bar type, which has proved satisfactory. The screening is reasonably good;

the screens do not easily clog, and they are easy to make and maintain.

The total capital cost of the installation, including the dismantling of the old plant, the alteration of the existing building, and the providing of new roof, laying of foundations, and the provision and erection of waste-heat boilers, engines, lift, and all other necessary accessories, was as low as the estimated cost for a horizontal retort scheme of similar output under the conditions at Dudley. (These necessitated in the case of horizontals the installation of duplicate electrical generating plant.)

WORKING RESULTS.

The working results will be of some interest. Period results depend greatly upon the coal mixture used and the rapid or slow alternation of each kind of coal in the mixture. I will, therefore, give both test results and period figures.

The following summarizes the result of a three days' test of North Staffordshire washed gas nuts:

Period of test.—65 hours continuous.

Plant Employed.—One complete setting of 8 retorts.

Steam.—All steam was supplied by the Galloway waste-heat boilers fitted with superheater coils.

Steam used (by calculation) per coal carbonized = approx. 22 p.ct.
Average temperature of steam at inlet of valves = 340° Fahr.

Coal.—Total coal carbonized weighed as received . = 89½ tons
Coal carbonized per retort per 24 hours . . = 4·13 tons

Gas.—(Saturated at 60° Fahr. and 30 in. bar.)—

Gas made per ton of coal carbonized . . . 22,330 c.ft.
" " " " " . . . 99·7 therms
Gas made per retort per 24 hours . . . . 92,200 c.ft.
" " " " " . . . . 412·1 therms
Average calorific power per c.ft. . . . . = 446·7 B.Th.U.
(Tested hourly throughout on a Simmance-Abady calorimeter with thermometers certified by the Gas Referees.)

Coke and Breeze.—During the whole period of test, the coke and breeze made and sent to producers was weighed; and the figures are without deduction for water or ash.

Coke and breeze made per ton of coal carbonized . 12·4 cwt.
(N.B.—20 p.ct. passed through a bar screen with ¾-in. spaces.)
Fuel to producers (no deductions for moisture or ash) per ton of coal carbonized. . . . . 3·6 cwt.
Coke and breeze available for sale per ton of coal carbonized . . . . . 8·8 cwt.

Analysis.—Coal as received:

	P.Ct.
Moisture	2·11
Volatile organic matter	35·81
Fixed carbon	58·02
Ash	4·06
	100·00

Coke as weighed from the retort house:

	P.Ct.
Moisture	1·7
Ash (dry basis)	6·5

It was the practice in these tests to use a small water spray on the coke leaving the retort; and the moisture content is, therefore, higher than is now the practice, the spray having been discontinued.

	P.Ct.
Gas.—Carbon dioxide	4·7
Unsaturated hydrocarbons	1·5
Oxygen	0·4
Carbon monoxide	20·5
Methane	18·5
Hydrogen	48·9
Nitrogen (by difference)	5·5
	100·0

	P.Ct.
Total inerts (including oxygen)	10·6
Total pan ash, percentage of coal carbonized	0·88

of which half was pan coke.

It was not possible in these tests accurately to measure the tar and ammoniacal liquor made.

The following summarizes the result of the first six months during which the plant was working alone in the coal gas section:

Coals.—Amount carbonized . . . . . 7095 tons

	P.Ct.
Origin of coal: North Staffordshire	50
South Yorkshire	20
Derbyshire	11
Mixed stock and test coals	19

Gas.—(Saturated at 60° Fahr. and 30-in. bar.)

Gas made per ton of coal carbonized (weighed as received without deductions) . . . 18,700 c.ft.
= 83·8 therms
Gas made per retort per 24 hours . . . . 78,300 c.ft.
= 350·8 therms
Calorific value (average of 24-hour records, calorimeter checked daily). B.Th.U. per c.ft. . . . . = 448
Coke and breeze available for sale (weighbridge weights without deductions) per ton of coal carbonized . . . . . = 8·2 cwt.

Regular tests of coke were not made, but recent samples of coke tested were found to contain 0·5 p.ct. of moisture.

Tar sold per ton of coal carbonized (under 5 p.ct. water content) . . . . . 18·6 gals.
Ammoniacal liquor sold (10 oz. gallons) per ton of coal carbonized . . . . . 37 "
Carbonizing wages (including elevator attendant and retort house foreman) . . . . . 0·38d. per therm

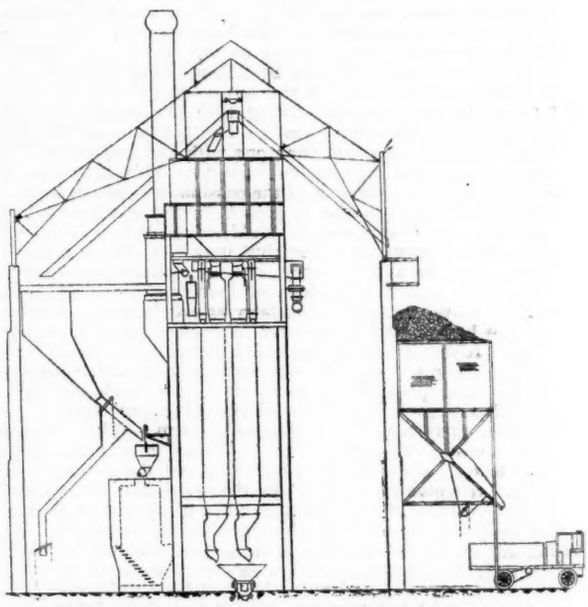
Average of regular "spot" analyses:

	P.Ct.
CO_2	6·6
C_nH_m	2·9
O_2	0·9
CO	14·6
CH_4	15·7
H_2	50·5
N	8·8
	100 0

Total inerts (including oxygen) = 16·3 p.ct.

One of the difficulties that has arisen in vertical retort practice with steaming has been the erosion that at times occurs of the silica retort material in the water gas reaction zone. As a result of considerable research, the experiment was tried at Dudley of using a silica material of slightly different constitution, which it was considered would resist this action. The alteration proved to be a retrograde step, and the experimental material failed to give satisfaction where subjected to the highest temperature—viz., on the furnace side of the front retorts. The experiment had its value, and the front retorts have now been rebuilt.

I feel compelled to place on record my appreciation of the promptness with which the contractors, Messrs. West's Gas Improvement Company, Ltd., accepted all responsibility for the experiment.



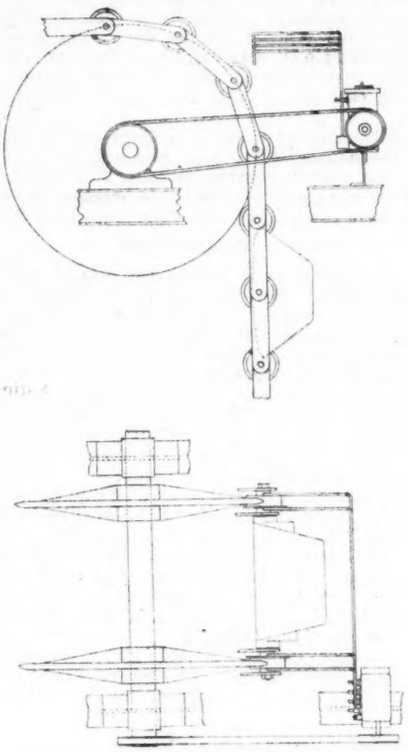
General Arrangement of Glover-West Vertical Retort Plant.

The lip-bucket conveyor is of the usual type—*i.e.*, the better-known gravity-bucket conveyor, but with the buckets overlapping on the horizontal runs, obviating the use of any rotary filling arrangements. The wheels on this were provided with internal oil chambers, and later some with grease gun lubricators. But the work of oiling or greasing each wheel individually, though ideal, is impracticable. The lubrication is now carried out by an arrangement (supplied by Messrs. West's Gas Improvement Company, and illustrated here) which is very simple, but has, I believe, some distinctive features. It is a mechanical pump lubricator with four outlets, each separately adjustable. The outlets are small copper tubes which can be easily bent to drop the oil exactly on the wheel axles each side of each wheel track. The important features are:

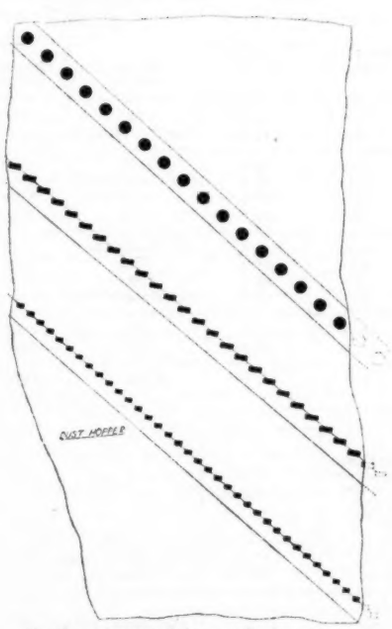
(1) It is positive in action, and not liable to block, as are taps partly turned off. Nor can any taps be left running when the conveyor is standing.
(2) It is fitted on the top of the descending length of the conveyor. The oil drops thus must reach one axle or another; and the wheels are hanging free, allowing the oil to travel along the axle to the inside.
(3) The oil pump is driven by a small belt at slow speed from a pulley fixed on the end of the conveyor idler-sprocket shaft. Thus it is only in action when the conveyor is at work.

The practically bone-dry coke manufactured in the plant mainly from washed gas nuts has proved most satisfactory for

domestic use; and a useful trade is now being developed in this direction. But the very fine dust that blows about on the works when the coke is being handled is a decided nuisance. Experiments are now being made to see if this can be avoided without in any way spoiling the coke. Water sprays have been installed at the top of several of the coke receiving chambers at the bottoms of the retorts. These are used for a certain short definite period at a definite number of minutes before the coke is drawn. The secret of success seems to be to wet the



Lubricator on L.B. Conveyor.

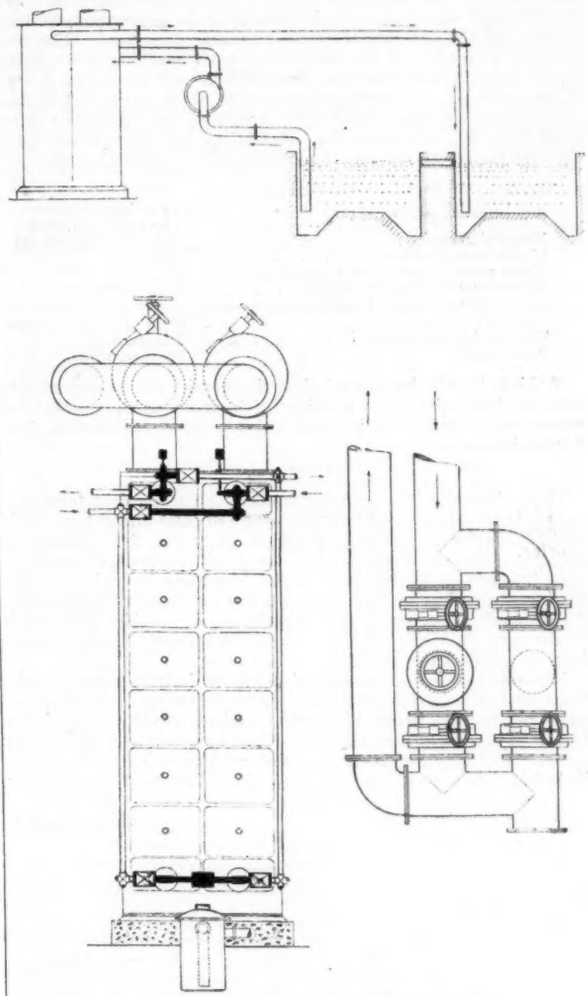


Section through Coke and Breeze Screens.

coke just sufficiently to prevent dust flying, but only enough to allow the greater part of the water to evaporate in the air within reasonable time from the still warm coke. Success appears to be within sight, but it now remains to make the water spray foolproof.

CONDENSATION.

Steamed vertical retorts, of course, throw more work upon the condensing plant; and it was necessary at Dudley to extend this. A Holmes horizontal water-tube condenser (illustrated) has been installed. This is a rectangular steel vessel with a central vertical partition fitted close to the top, but ending some distance from the bottom. The gas enters at the top on one side of the division, travels down the condenser and up on the other side of the division, leaving at the top. Through the two gas spaces pass two batteries of water tubes, each in a number of batches



Holmes' Horizontal Water-Tube Condenser.

set at a slight incline to the horizontal. The water takes a counterflow to the gas, backwards and forwards down one side, and up again on the other. The valves are set on the top, and are so arranged that the direction of the flow of gas through the condenser can be reversed if necessary. They are of Messrs. Westwood & Wrights' manufacture, specially made right and left handed, and with stalks set at an angle of 45°. This allows the stalks of any pair to be inspected and easily withdrawn while gas is by-passed through the other pair.

The water connections have been so arranged that either town water can be used throughout, or water can be circulated by means of a small belt-driven centrifugal pump from two large intercommunicating gasholder tanks. Furthermore, town water can be used on one half of the condenser while gasholder water is circulated through the other half, and both are independently controlled.

All the water consumed on the works is South Staffordshire Waterworks Company's water. All water used on the works' and waste-heat boilers passes through this condenser, and the remaining gas cooling, if any is needed, can be carried out by the water circulated from the gasholder tanks. Cooling water thus costs practically nothing, and boiler water is to some extent preheated.

Investigations and tests which have been made on the condenser will be of interest. I should like to acknowledge my indebtedness for the care with which they were made by Mr. Chas. Cooper, M.Sc. (Manc.), and Mr. G. S. Watson, M.Sc. (Gas Eng., Leeds), of the technical staff of Messrs. W. C. Holmes & Co., Ltd.

In these tests an endeavour was made to obtain results with different inlet temperatures—viz., 120°, 140°, and 160°. This was made possible by passing more or less of the gas through existing and preceding atmospheric condensers. The crude gas has to pass through two mains fixed in parallel—one 14-in. main overhead and one 12-in. main underground, both 65 yards long, between the retort house and the condensers. This would

appear to account for the small proportion of tar in the condensate. In view of this and the physical condition of the tar at the condenser inlet, all thermal quantities relating to the tar have been neglected in the thermal balances.

The thermometers used were checked and corrected when necessary by thermometers certified by the Gas Referees. The water used was measured by collecting in a large measuring tank, and the condensates were similarly measured. The condenser was allowed to run before each test for some hours until stable conditions (*i.e.*, fluctuations not exceeding ± 1·5° Fahr. about a mean temperature) were obtained, and then constant readings were made and averaged for an hour. After each test, the condenser was allowed to run undisturbed for a further period, to see that conditions still remained stable.

DATA.

Size of condenser	5 ft. by 7 ft. 10 in. by 15 ft. 3 in. high
Nominal capacity	1¼ million c.ft. per day
Water cooling surface	2424 sq.ft.
Water cooling surface per 1000 c.ft. per day	1·94 ,,
Approximate air-cooled surface	450 ,,
Approximate air-cooled surface per 1000 c.ft. per day	0·36 ,,
Date put into operation	August, 1925
Date of tests	January, 1926

I think it will be agreed that the condenser is remarkably efficient from the point of view of both condensing area and water consumption. It has given the greatest satisfaction since it was installed.

HAULAGE.

Horse haulage has been superseded by mechanical transport except for the peak load in the haulage of coke and ashes. This ensures as far as possible constant work for the mechanical vehicles, which is essential for the most economical working. Coal haulage from station to works is entirely by hydraulically-tipping steam lorries of 5 tons capacity, each consuming coke. As a result of some years' experience, I consider that such lorries are decidedly cheaper to run for heavy haulage than internal-combustion vehicles.

Running costs, of course, depend so largely upon conditions that all figures must be qualified thereby. At Dudley, costs per ton are heavy because unloading at the station is by hand. The average cost over the last four years of the steam lorries (which have been running continuously since 1916), including all wages, fuel, repairs, &c., has been 5s. 7d. per actual working hour (no standing time included). No depreciation is included in this figure in the last two years, as the original cost had been written-off previously. But in the depreciating period the cost, due principally to less repairs, did not exceed this figure. The average amount of coal handled from the station per working hour has been 5·53 tons.

The cost of an English-built 30-cwt. load petrol motor lorry used for coke delivery and general district work has been 6s. 11d. per working hour, and of a 1 ton Ford van used for district work 3s. 3d. per working hour. These are the averages of the last two years, as previous records are not reliable. But the vehicles are not new. The cost includes all charges, with 15 p.ct. depreciation per annum. Wages on the Ford have been about 50 p.ct. of those on the other lorry, and in the case of the latter form nearly 50 p.ct. of the total cost.

Much subsidiary work has been necessary, of course, arranging for the housing of motors, arranging stores, shops, &c.; but only the briefest mention of these is possible. The work is still continuing with a view at the moment to consolidating stores under one roof, and installing a machine shop.

ORGANIZATION.

I had the honour some three years ago of reading a paper to the Association upon the subject of organization, and I therefore do not propose to repeat details given then. Suffice to say that in reorganization the basic principles followed have been to erect a skeleton which shall form a sound basis for expansion and modification with the minimum of future dislocation, and to do so without adding unduly to existing costs of administration, to allow for the human factor, to utilize the existing staff to the best of its abilities, and to prepare in advance to justify the confidence the consumer is asked to place in the Company before he is so asked.

Upon the district, the maintenance of consumers' appliances in efficient condition is considered to be of primary importance. A scheme of regular attention at a small fixed charge was initiated. This proved a failure; and very few consumers would adopt the scheme. Free maintenance of all appliances, whether on hire, hire purchase, or the consumer's own property, has now been adopted. But a charge is made for all materials used, such as mantles, glasses, &c. Parts of hire-purchase appliances proving defective during the hire-purchase period are, of course, replaced free. The scheme is successful; some 23 p.ct. of the Company's ordinary meter consumers having

Tests of Horizontal Water Tube Condenser.

Test No.	Temperatures ° Fahr.				Gas per Hour, Corrected to 60° Fahr., and 30 in. 1000 C.Ft.	Water.		Condensates per Million C.Ft. of Gas. (Corrected).	
	Gas.		Water.			Per Hour. Gallons.	Per 1000 C.Ft. of Gas. Gallons.	Actual Gallons.	Theoretical Gallons.
	In.	Out.	In.	Out.					
11	125	62	48	114	36·8	360	9·8	620	600
12	128	59	50	104	42·0	657	15·6	Not determined	740
14	141	62	52	111	47·5	912	19·2	1080	1050
16	140	64	52	111	43·5	860	19·7	Not determined	1050
17	140	63	52	115	44·6	756	16·9	1000	1050
18	140	62	51	111	43·5	860	19·8	1000	1050
9	160	59	50	120	37·0	1090	29·5	Not determined	2200
1	159	62	46	131	41·4	950	23·0	1800	1940
2	155	63	46	137	43·2	850	19·7	1790	1750
3	156	64	46	136	47·0	885	18·8	Not determined	1750
4	156	71	52	117	49·4	1340	27·2	1880	1760
5	151	68	53	111	47·0	1220	26·0	1380	1440
6	149	55	46	126	45·1	826	18·5	1380	1480

Test No.	Millions of B.Th.U. per Million C.Ft. of Gas (Corrected).		Atmospheric Temperature. ° Fahr.	B.Th.U. Taken up by Water per Gallon.	Condensing Surface per 1000 C.Ft. of Gas per Day. Sq. Ft.	K. (See Below).	Remarks.
	From Gas.	Taken up by Water.					
11	7·3	6·5	50	660	2·74	7·9	Gas temp. range, 130° to 60° Fahr. K = 8·35
12	8·9	8·6	48	540	2·42	8·8	
14	12·0	11·3	48	590	2·13	11·1	Gas temp. range, 140° to 60° Fahr. K = 10·6
16	11·7	11·7	48	590	2·32	10·2	
17	12·0	10·8	45	630	2·27	11·0	
18	11·8	11·8	49	600	2·32	10 2	
9	24·1	20·6	46	700	2·73	12·9	Gas temp. range, 160° to 60° Fahr. K = 15·6
1	21·6	19·6	44	850	2·44	15·2	
2	19·4	18·0	44	910	2 34	18·2	
3	19·5	17·0	44	920	2·15	17·3	
4	19·5	17·6	44	650	1·03	24·7	Half condenser only. K = 23·6
5	16·1	15·1	44	580	1·08	21·6	
6	16·6	14·8	44	800	1·77	21·6	71 p.ct. of condenser. K=21·6

K = the transmission coefficient—*i.e.*, B.Th.U. taken up by the water per hour per sq. ft. of condensing area per 1° Fahr. mean temperature difference.
The average temperature of the condensates was 70° Fahr.
The average composition of the condensates was liquor 93 p.ct. (6 oz. to 7 oz. strength); tar, 7 p.ct.

adopted it. It is spreading slowly; but the difficulties to be faced are the Black Country temperament, which looks for the "catch" in all things, particularly if they are free, and the dearth of exactly the right type of man for the work—one who is both willing and capable of instruction, and of a temperament acceptable to the consumer.

The principle of hire purchase rather than hire is favoured for appliances, as it is considered more satisfactory in the long run to both consumer and Company. For this reason, the simple hire list of cookers has been reduced to the two most popular sizes of each of two patterns. But an extensive list of cookers is offered on hire purchase on three or seven year terms, and of gas fires on three-year terms. Practically all appliances are fixed free within certain limits; and this, in conjunction with hire-purchase terms, is found to be a very strong inducement to business. The consumer feels the Company has confidence in its own recommendations, and he risks only a few shillings in trying the appliance. If it proves unsatisfactory, he can return it. But surprisingly few appliances on hire purchase are ever returned. The cost of free fixing is just more than balanced by the net profit of the appliance. It is a principle that all this type of business should involve no financial loss, though carrying very little profit.

The extension of such facilities as these is decided by a consideration of the capital position, the current increases of gas sales, and the possibility of dealing with the expansion of fitting business involved—in view of the extreme shortage of really skilled fitters available. It appears that, unless the capital position is extremely favourable, a too-rapid expansion of business may become embarrassing, and not to the ultimate benefit of consumer, Company, or the industry at large.

The Dudley Company have always made a feature of complete free-fitting installations with cookers and slot meters. Here again, however, unless the consumption warrants the capital expenditure, the business may be a retrograde step. Recently, the whole of this facility has been diverted, by agreement with the Corporation, to all their new housing schemes. This has resulted in the reinstatement of gas for lighting, to the total expulsion of electricity; and the consumers are the best of this type. Though none of the houses has been occupied twelve months yet, the average consumption of the 120 completed is at the rate of 22,000 c.ft. per annum.

Working on these lines, the consumption of the Company has been increased to 276¼ million c.ft.—an increase of 38·8 p.ct. —and its consumers from 6768 to 10,103, since 1914. The average price of gas is now 47·7 p.ct. above that of 1914, and maximum dividends have always been paid. Capital charges have been reduced from 10·6d. to 8·9d. per 1000 c.ft.

Turning now to the second section of the Address, What are the paramount needs of the industry as seen from the crow's nest of the 300 million ship?

Government Electricity Scheme.

I suppose the subject interesting us most is the Government's proposed electricity scheme. The industry is a long way from being panic-stricken, but it does foresee with some concern the effect that the scheme, as far as it is known, will have upon the competition it has to face, more particularly, of course, in the smaller country towns. The gas industry has braced itself to meet the dangers, and, as always, it will gain by the effort. The President of the National Gas Council has sounded the clarion call to the industry to put its house in order, to set about serving its consumers better, and to work with greater efficiency. How is the industry to do this? I feel strongly that the first thing many undertakings have to do is thoroughly to overhaul their general organization. Many of the larger undertakings have, of course, been a model for years; but one has viewed elsewhere with some concern and alarm inducements made to obtain consumers' custom and confidence when one knows only too well that the result, should any considerable business accrue, would be chaos, delay, and dissatisfaction.

One would ask oneself, Do I obtain the cost of reconstruction work accurately? Can I tell where and when trouble is likely to occur on the works, and forestall it? Do I learn the true cost of fittings business, whether it is earning a profit or loss? Do I know promptly the cost of various forms of free service to the consumer or maintenance work? Or do I have to wait probably twelve months before I can see whether costs are excessive? Can I tell from time to time promptly whether the cost of executing work is increasing or decreasing? Does the consumer grumble when he feels like it, or does he refrain from grumbling because he knows he will get no reply if he does? Do jobs occasionally get overlooked, and do wrong accounts go out, and have to be corrected subsequently? Do stores ever go astray? Is there friction and misunderstanding among the staff? Many such questions could be asked; and the secret of a satisfactory reply—and the success of an undertaking depends upon a satisfactory reply to every one—depends mainly upon organization. There are very few of us who cannot see where some improvement can be made.

Organization undoubtedly costs money; but so does coal, and one is as essential to success as the other. But organization need not be allowed to run riot, and the obtaining of figures that are merely interesting can be tabooed. The cost, however, in any case will not be as great as would appear upon the surface. A decrease of wages per 1000 c.ft. will almost inevitably follow any real improvement of organization. I would define good organization as a method of dealing with affairs with the minimum of labour and delay, and with the maximum of efficiency. It should as its ultimate aim enable the chief executive to have his finger upon the pulse of the whole undertaking, and should indicate to him immediately any point needing assistance before trouble, loss, or congestion occurs.

Research.

The gas industry appears to need greatly increased research. To give only a few examples, upon the works, design seems to have outrun the materials available. The output from coal appears to be restricted only by the want of more suitable and durable refractories. Upon the district, the design of appliances outruns our knowledge of their usefulness and efficiency in use. Opinions are even now divided, for instance, as to whether the drilled or solid flame type of hotplate burner is the more desirable.

Large sums of money and much valuable thought are being constantly expended upon the practical design of plant and appliances by the manufacturers. For this the industry generally is greatly indebted. The work is in the hands of men of whom the industry has reason to be proud. If such work, however, were more closely co-ordinated, and carried out by the industry as a whole, some repetition of labour might be avoided, and more marked and generally-agreed advances made. The issue, for instance—to take one small example—of a complete range of an improved appliance to get in front of the market, to be again improved a very short time afterwards with another completely new range, might be avoided.

Several of the larger gas undertakings, too, have of course done, and are continuing to do, invaluable work upon works problems such as purification, &c. Of the knowledge gained, they gladly give the industry from time to time the benefit. But again, if this were all for the industry at large, and controlled thereby, surely a broader outlook and more widespread benefit would result.

I understand that during last year the Institution of Gas Engineers and the British Commercial Gas Association together spent about £8000 upon research work, which is equal to only 0·007d. per 1000 c.ft. of gas made in this country. By reason of the amount of money spent, and the type of work done, only the fringe of the practical problems facing every engineer each day has been approached.

Research upon elementary principles is absolutely essential to a correct approach to practical problems. Meanwhile these everyday problems upon which financial success or failure depends have to be faced. The crying need of the smaller undertakings for reliable information calls, I suggest, for the immediate formation of a testing bureau, which could be self-supporting, somewhat upon the lines of the arrangements of the Royal Automobile Club. It should be possible for any undertaking to send anything from lubricating oil to a gas cooker to the bureau, and, for a small fee, obtain some idea of its performance. It should also be possible for the manufacturer to send his standard stock article to the independent bureau, and for a fee obtain a certificate of performance. These tests would not necessarily need to be absolute, so long as they were comparative, impartial, and upon agreed lines. The whole matter would, of course, be distinctly technical, and the proper body to deal with it would appear to be the Institution of Gas Engineers.

Some such arrangement, too, seems to be called for to meet the recommendations of the memorandum to the Board of Trade upon defective fittings, which is still a live document, and has still to be faced.

Propaganda.

Advertising and propaganda have now an accepted place in our industry. But, comparatively, how little we really do! The amount spent by the British Commercial Gas Association totals approximately to 0·1 p.ct. on the turnover of gas undertakings. The British Commercial Gas Association cares for the national effort, which is so essential, and is the business of no one undertaking; and it does it as well as the industry allows. One would go further, and say that for the money expended it does excellently—so well, in fact, that it is being paid the compliment of the sincerest form of flattery. But locally, how much does each of us spend, even including free service to the consumer—a form of advertisement? Large retail houses in other industries consider 2½ p.ct. of their turnover a conservative amount. This would mean practically £2000 in the case of the undertaking which I have the honour to serve, equal to 1⅛d. per 1000 c.ft. of gas sold. It actually spends about 0·4d. per 1000 c.ft., equal to about 0·6 p.ct. of the turnover (exclusive of free service, but inclusive of the "B.C.G.A." subscription). Even this amount is, I believe, above the normal for the size of undertaking, but to it is attributed a good share of the continuously progressive output in a restricted area. If the industry realized the necessity for this expenditure, there would be no doubt of future increases of consumption, and it would go a long way to counter the coming fiercer competition. But it must be done in advance, and constantly.

The recent experience at Dudley may be of interest in this

connection. It was decided to start a retail sack trade in domestic coke. The campaign was launched by sending by post to every ordinary meter consumer a letter on the subject, offering in conclusion one sample bag at half-price, and enclosing a printed pamphlet on the use of coke, and an unstamped reply postcard. The replies received amounted to 35 p.ct. of the letters sent, which, even with the half-price offer as bait, was considered a good proportion. This commenced in November last, and there are already booked orders for regular supplies amounting to 10 p.ct. of the number of original letters. In addition there is a considerable quantity of single odd sacks sold. Moreover, as a result of the trial of the sample by principals of firms, several industrial contracts at good prices have been obtained. But the point I wish to make is that, though it is so difficult for a public utility undertaking to judge of the effect of its advertisements, yet such a rapid response to a postal effort shows the value of consistent propaganda. It is considered that the result obtained was as much attributable to the cumulative effect of consistent propaganda, upon the veracity of which the consumer had learned to rely, as to the actual letter.

The Future Engineer.

The Education Scheme of the Institution is a very worthy movement in the right direction; but it is, of course, the commencement. Gas engineering in the days of our grandfathers could probably have been learned by experience alone. But to-day it certainly cannot, and experience must carry with it scientific knowledge. One looks forward to the time when to be a member of the Institution of Gas Engineers will be considered to be as much an honour as membership of the most august scientific body in the country. Scientific attainments as well as experience will surely be essential to membership, and will together also, as a matter of course, carry membership with them. But the scheme adds another call upon the efforts of the future engineer. These calls upon his ability become heavier every day, and one may well inquire with some concern whether the best men of the country are seeking to enter our ranks. As good or as bad as we are, are the men following us better men and better equipped? Is it inevitable that many of the best scientific men in the industry should go over from the independent gas manufacturing side to the contracting side, the outlook of which would seem to be inevitably more restricted? Do the majority of gas engineers give their sons the best training that English Universities can give, and then bring them into the gas industry?

Bigger effort calls for longer training and better brains. Better brains deserve adequate reward—and will obtain it, if not in the gas industry, then elsewhere. A wholesale provision merchant in my own town was recently anxious to place a son with scientific leanings in a profession, and thought of gas engineering. He learned of the prospects, and with his son's ready agreement decided to go elsewhere. "It is a very small shop," said he, "that does not produce £1000 per year." How many or how few gas engineers obtain even this reward? Conditions, of course, vary widely, as, to some extent, they always will, depending upon ability, responsibility, &c. But quite a good return for controlling an undertaking with an annual turnover of some £70,000 to £100,000 seems often to be considered about £500 per annum. Every gas engineer knows cases very much worse than this. In general competitive industry £1500 would not be considered unusual. The gas engineer's position is, perhaps, even the more precarious. His opportunities are more restricted, and a failure of his health ruins him.

I feel free to raise this matter, as the happiest relations exist between my Directors and myself, and I have no personal axe to grind. But I feel it is a most important matter. Sir Arthur Duckham, in his Presidential Address last year to the Institution of Chemical Engineers, said that the future of industry lay in the hands of the chemical engineer. How true this is, every passing day emphasizes; and the industry will progress the most that attracts the best men by adequate return. If the industry is to have the advantage of the best brains, those who hold the purse strings must face the position.

Broad Outlook.

In this, as in many other ways, we need a broader outlook. The field of the industry is broad. But we need to look beyond our own fences. One has often been surprised personally to find that things one did on a gas-works in a manner apparently immutable were being done quite differently elsewhere. The other man's way may not suit one's own conditions, but it starts trains of thought that lead inevitably to progress. It seems a loss to the industry that gas engineers so seldom trouble to join and take an active part in the affairs of institutions of engineers other than their own. Personal contact and discussion are so valuable. In this matter, the Junior Associations in a small way have given us a lead in their annual meetings with engineers in other branches of industry—a lead we might be well advised to follow—which, in fact, one local Association at least has already followed.

We need also, I feel, a closer bond with our Junior Associations. The "Junior," using the term in its wide sense, has the opportunity of studying technical problems more closely than those of us who are engineers and managers. Management to-day takes by far the bigger proportion of our time. The "Juniors" have often much to teach us of technical matters. From the "Seniors," too, they might learn something of the necessity for making ends meet in the trading concern that is called a gas undertaking—might learn that all is not gold that glistens. In the district sections of certain other engineering institutions, the junior and senior members of the institution always meet together in the general reading and discussion of papers. I am aware that their constitution and membership is on a somewhat different basis, but I would suggest that much good would result from at least occasional joint meetings of the district junior and senior Gas Associations.

Management is our business, as well as engineering. To-day, it may even be considered the more important for the industry's ultimate progress. This is an Association of Managers as well as Engineers. I feel, therefore, I need make no apology for having touched upon some matters not purely technical.

It has often been said "Let a man write a better book, preach a better sermon, or make a better mousetrap than his neighbour, and the world will make a beaten path to his door, even though it be in the midst of a forest." But I would suggest this does not go far enough. The gas industry makes a good mousetrap. It has to seek how to make an even better one. But it must leave the forest, and save the world the trouble of making the beaten path. It must take the mousetrap to the world's front door, and tell him all its advantages.

Ruskin has written: "The more readily we admit the possibility of our own cherished convictions being mixed with error, the more vital and helpful whatever is right in them will become." The gas industry stands once again at the cross-roads. But if the wise leadership it is fortunate to possess is supported by a broadened outlook in its provinces, it has nothing to fear from the future.

Thanks to the President.

Mr. Morland, proposing a hearty vote of thanks to the President for his interesting and thoughtful address, said it had been of value from start to finish, and would provide them all with much food for thought. Probably there was no one in the room who, having followed the address, would not have derived some benefit from it. He had dealt with most of the subjects that one met with on a gas-works, and he had also discussed the administrative side and distribution developments. The last-named branch was of great importance at the present day, because, with the keener competition of electricity, it was necessary that the gas industry should follow-up every advantage. In this connection he had been very pleased to hear that in Dudley the Council were now replacing electricity by gas in their housing schemes. The address afforded conclusive proof of the wisdom of the members in choosing Mr. Briggs as President.

Mr. James Paterson (Cheltenham) seconded the vote of thanks to the President for what had been a most inspiring address. For quality the address would be hard indeed to beat; and it had placed Mr. Briggs in the front rank of presidents. They could feel assured of a highly interesting year with him in the chair; and they would all look forward to the projected visit to Dudley for the purpose of seeing his "mousetrap."

The President, in reply to the vote (which was heartily accorded), said it was ten years almost to a month since he came to the Midlands and joined that Association, and from that time forward he had found every gas manager in the Midlands his friend. Each one desired to assist his neighbour. In conclusion, he appealed to the younger members to be more "vocal" in their contributions to the Association.

A Visit to Dudley.

The President said they now had to consider the date and place of the spring meeting. He was fortunate in having with him Mr. W. W. Skidmore Westwood, the Chairman of the Dudley Gas Company, and he would ask him to say a few words on this subject.

Mr. Westwood said this was the first time he had attended one of the Association meetings; and he very much appreciated the honour of being present. Up to now he had always thought it better for the members to hold their meetings almost secretly, and discuss their affairs in their own way. A chairman like himself might come to the meetings, and pick up a few technical details which would result in his becoming a nuisance to the manager, and perhaps a menace to the value of the stockholders' property. He greatly appreciated the work the Association were doing. The gas industry was a highly important one; and in keeping it to the front much depended upon the researches and inventions of those engaged in it. Theirs was not the only industry in the field; but, British-like, they were somewhat glad of this, because it gave them something to fight. The great honour which the Association had conferred upon Mr. Briggs was felt by him (the speaker) and every member of his Board to be an honour, not only to Mr. Briggs, but to the Company and to the town. Mr. Briggs was very energetic, and had worked his way up to his present distinguished position, which he was well qualified to fill. He understood there was a possibility of the Association visiting

Dudley during May; and he had come to offer the members, on behalf of his Board, a most hearty welcome and their best hospitality. The Dudley Gas Company was a small business compared with some of the undertakings represented there that day; but they could not measure their hospitality by the size of the works. They could not offer the members anything like they saw in Oxford, because theirs was essentially a working man's town. There were, however, some things of mechanical interest which would be available for them to inspect.

The PRESIDENT said he was sure the members would desire him to thank Mr. Westwood and the other Directors for the kind invitation to Dudley. The Committee suggested that the visit should take place on May 6, instead of on the date already announced.

A vote of thanks was passed to the Chairman and Directors for their invitation.

SMOKE ABATEMENT EXHIBITION IN BIRMINGHAM.

The PRESIDENT then called upon Mr. Rogers and Mr. Mason to give the meeting some details of the National Smoke Abatement Exhibition which it was being arranged should be held in Birmingham during September next.

Mr. R. J. ROGERS (Birmingham) said the intention was to hold the exhibition in Birmingham from Sept. 6 to 18. They all knew the importance of the subject of smoke abatement from the point of view of the gas industry; and on the invitation of the Smoke Abatement League of Great Britain, who were really the promoters, the British Commercial Gas Association were asked to appoint a Gas Committee to represent the industry. This Committee it had been arranged should consist of Mr. John E. Cowen (the Chairman of the Newcastle-on-Tyne and Gateshead Gas Company and President of the "B.C.G.A."), Alderman J. H. Lloyd, Mr. A. W Smith, Mr. Hubert Pooley, and Mr. F. W. Goodenough. A Sub-Committee of local engineers had also been formed, consisting of Mr. J. W. Allin, of West Bromwich; Mr. F. C. Briggs, of Dudley; Mr. F. Davies, of Walsall; Mr. E. Hardiker, of Smethwick; Mr. P. N. Langford, of Coventry; Mr. A. W. Smith, of Birmingham; Mr. W. M. Mason, Manager of the "B.C.G.A.;" and Mr. R. J. Rogers as Hon. Secretary. This Sub-Committee had met that morning for the first time; and he had been asked to outline briefly the position as existing at the present moment. Of other Sub-Committees formed, one was an Electricity Sub-Committee; and, so far as could be ascertained, the electrical industry were going to take every opportunity of bringing their goods to the notice of the public in that area. The exhibition was to be a national one; and it would have a very wide field, because the annual conference of the Smoke Abatement League of Great Britain, comprising representatives of most of the municipalities in the country, would be held during the run of the exhibition, and it was expected that there would be a very large gathering. The electrical industry would also be holding certain conferences during the exhibition; and the Gas Sub-Committee were naturally anxious that every opportunity should be taken by the gas industry to derive whatever benefit and publicity were possible from the exhibition. Within the last day or two prospectuses had been forwarded by the promoters to likely exhibitors; and it was necessary, so far as manufacturers were concerned, that the earliest possible application for space should be made, because, if the gas industry did not take up the space, there was no doubt that other sources of heat—either electricity or products from low-temperature carbonization—and other exhibitors, would do so. The Gas Sub-Committee had discussed the question as to how the Midland gas undertakings could be represented at the exhibition; and it had been suggested that an appeal should be made to them for some financial support in order to carry out a scheme of publicity in the district and to arrange a co-operative exhibit. Mr. Mason would be able to tell them that, so far as the funds of the "B.C.G.A." were concerned, these were strained to the utmost in carrying out the national work of publicity in which they were engaged. It was therefore for the Midland undertakings to get together and secure the utmost benefit for their district from the exhibition. He hoped that when the appeal came along the members would give it favourable consideration; and he was quite certain that any contributions to the fund would be very well spent, and would result in benefit to the industry which they all had at heart.

Mr. W. M. MASON (Manager of the "B.C.G.A.") expressed his admiration for the address which the President had delivered. It was seldom one heard such an inspiring utterance. Admiration, of course, was what people bestowed upon those whose opinions coincided with their own [Laughter]; and he thought the address to which they had just listened had a bearing on what he wished to say to them. He had been particularly interested, as no doubt they had all been, in the point of the relative value of sales development to cost, which the President had elaborated so excellently. It was perfectly true that the resources of the "B.C.G.A." were strained; and the President had indicated how comparatively small they were. This Smoke Abatement Exhibition, however, offered a splendid opportunity for keeping up the gas end of the stick, of which he hoped that the Midland district would take the fullest possible advantage. It needed keeping up, as most of them knew. He would like to call the attention of those present to the fact that two "B.C.G.A." District Conferences had been arranged which would be of interest to the members. One of these was to be at Smethwick; and it was sincerely hoped that this would enjoy the active support of them all, so that good publicity might result. The other district conference, which should appeal to some of the members, was really in the Manchester area, but on the fringe of the Midland district. It was to be held at Buxton on Friday, May 14; and the "B.C.G.A." had the authority of the Gas Engineer there for extending a cordial invitation to any of the members of the Midland Association who could possibly make it convenient to attend. The subject was to be "Putting Our House in Order." Another fixture was the annual Salesmen's Conference, which it was intended to hold in Birmingham during the run of the Smoke Abatement Exhibition.

The PRESIDENT, on behalf of the Association, thanked Mr. Rogers and Mr. Mason for their remarks.

METER REPAIRS AT GAS-WORKS.

Mr. HAROLD DAVIES, of Chesterfield, opened an informal discussion on "Meter Repairs at Gas-Works," which had been unavoidably postponed from the previous meeting.

At the conclusion of the discussion, a vote of thanks was passed to Mr. Davies, on the proposition of the PRESIDENT, seconded by Mr. BELTON.

ROAD TAR PREPARATION IN FRANCE.

[In "Chimie et Industrie" for January appeared an article on the above subject from the pen of the well-known chemical engineer, M. Ch. Ab-der-Halden. The author gives the specification of a tar considered satisfactory for road dressing in France, and describes a simple plant and process for its production. He advocates direct transport of the hot tar to the place of utilization. The article (of which a translation of the major part follows) should appeal to the engineers of small and medium-sized works in this country.]

In introducing his article, M. Ab-der-Halden states his belief that the development of modern transport has sealed the fate of the *pavé* road, and that the built-up tarred road will gradually supplant it on the Continent. As for the modern road, tarring has for its object to provide between the components of the top dressing a binder unaffected by the atmosphere, and sufficiently plastic to stand against surface deformation; and these conditions are only fulfilled by specially prepared tar.

From this it will be understood that the tar must not contain any constituents soluble in water or volatile in air. The author's brief summary of its characteristics is worthy of reproduction.

Water.—Crude tar under the most favourable gas-works conditions has a water content of 1·5 to 10 p.ct. and often more; and the presence of water, which is not miscible with tar, prevents the latter binding with the road material.

Light Oils.—Benzene and its homologues have a vapour-tension such that their evaporation takes place as soon as the tar is spread; and as they are present up to 1 to 5 p.ct. of the crude tar, it is needless to emphasize the importance of their recovery for the Nation.

Phenols and Cresols are present in crude tar to the extent of 0·5 to 3 p.ct., and are readily soluble in water, and quickly washed out of the dressing.

Naphthalene, of which crude tar contains from 5 to 10 p.ct., is readily eliminated under the action of the air; and whereas 0·4 gr. saturate 1 cub.m. of air at 20° C., the latter can carry 6 gr. at 50° C.—and tar is sprayed at a higher temperature.

Thus it is seen that, according to their origin, crude tars contain from 8 to 28 p.ct. of matter subject to removal by atmospheric agencies; and with these considerations in mind M. Ab-der-Halden has arrived at the following specification for road tar:

	Less than
Water content	0·1 p.ct.
Distillation 0°–200°	0·1 ,,
200°–270°	10–15 ,,
270°–360°	15–25 ,,
pitch	60–75 ,,
Naphthalene	0·5 ,,
Phenols and cresols	0·5 ,,

Preparation of Road Tar.

It will be noticed that the products which have to be eliminated have boiling-points between 100° and 225° C.; and it would on first blush appear that simple distillation up to the latter figure would meet the case. But such is not adequate, for, owing to the complex nature of the constituents of crude tar, the naphthalene (although its boiling-point is 218° C.) is held in solution by the heavy oils and only passes over between 225° and 270° C. It is therefore necessary to work to this higher temperature; and in consequence the tar is deprived of certain light oils, and attains an awkward viscosity. The difficulty can be surmounted by condensing-out the naphthalene, and re-incorporating the light oils in the tar; but normally this procedure is complicated, costly, and delicate, and, further, impairs the yield of bye-products.

The author claims to have overcome the obstacles in easy fashion by adapting his steaming process [to which several references have been made in the "Journal" of recent years] to the problem. Experience has shown that what happens in steam distillation is that the mutual attraction of the complex hydrocarbons, non-miscible in water, gives way before the attraction of the steam, and that the constituents have a tendency to arrange themselves properly according to their vapour-tensions. Thus, the naphthalene will pass off *in toto* in the products boiling at 210° to 230° C. Further, the actual process actually lowers the various boiling-points, and consequently the maximum temperature of working comes down to 180° C. The practical results are that tar suitable for road dressing is obtained direct, and that the other products are of a commercial standard, without further rectification.

The plant, as outlined by M. Ab-der-Halden, appears simple enough. Crude tar is raised by a pump 2 from the tank 1, and passes into a heat-exchanger 3, where it is warmed at the expense of the hot prepared tar. Thence it enters a still 4. The latter is kept full of the dehydrated tar at the required temperature, and the crude is run-in direct; a jet of steam being admitted at the base of the still. The arrangement is such that the light oils, naphthalene, &c., are removed almost instantaneously; the prepared tar being run-off as required through the heat-exchanger 3 and the storage tank 9 into the motor tank-wagon 10.

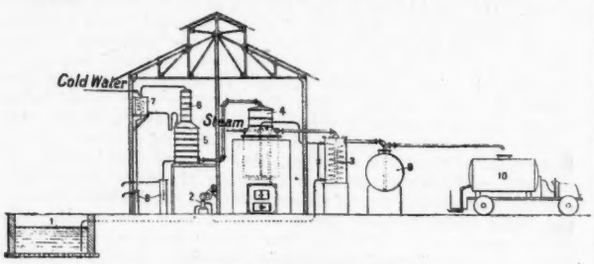


Diagram of Road-Tar Plant.

The distillates are led into a rectifier 5, where they are cooled by a counter-current stream of water; naphthas and condensed steam are taken from the base of the column 5, and thereafter decanted in the separator 8; while the light-oil fractions are fixed in the column 6, and finally condensed in the vessel 7.

The following figures show the average composition of the products obtained in a plant treating, per 24 hours, 50 metric tons of tar from a Lorraine coke-works.

Prepared Tar.

Water content	0·05 p.ct.	Distillation (above 225° C.)—	
Naphthalene	1·5 ,,	At 270° C.	13 p.ct.
Phenols	0·3 ,,	270°–360°	21 ,,
		Pitch	66 ,,

Naphthas (distilled from 182° C.)		Light Oils (distilled from 70° C.)	
At 187° C.	10 p.ct. (pale yellow)	At 92° C.	10 p.ct. (almost white)
193° C.	20 p.ct.	117° C.	20 p.ct. (pale straw colour)
198° C.	30 ,,	125° C.	30 p.ct.
198·5° C.	40 ,,	130° C.	40 ,,
201° C.	50 ,,	137° C.	50 ,,
211° C.	60 ,,	143° C.	60 ,,
215° C.	70 ,,	156° C.	70 ,,
217° C.	80 ,,	162° C.	80 ,,
223° C.	90 ,,	178° C.	90 ,,
		184° C.	dry

Tar Spraying.

Owing to its low conductivity, it is a laborious and costly affair to reheat tar for road spraying; and by far the best thing is to transport it while still hot from the process of preparation. Such practice has been adopted by M. Ab-der-Halden; and the article in our contemporary contains an illustration of a lorry filling-up at the works. The tar is loaded at a temperature of about 160° C.; and it has been found that the wagon can cover 50 km. (over 31 miles) in average weather without the tar cooling sufficiently to prevent its been sprayed without re-heating. The radius of action can be extended to 100 km. by the simple expedient of passing the exhaust gases from the motor through a coil in the tank. It is, moreover, noteworthy that the wagon does its journey on the benzole recovered in preparing the tar.

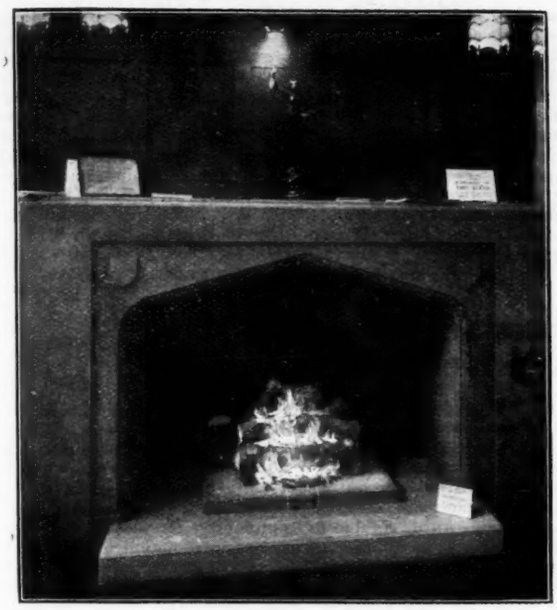
IDEAL HOME EXHIBITION.

Views of the London Gas Exhibit.

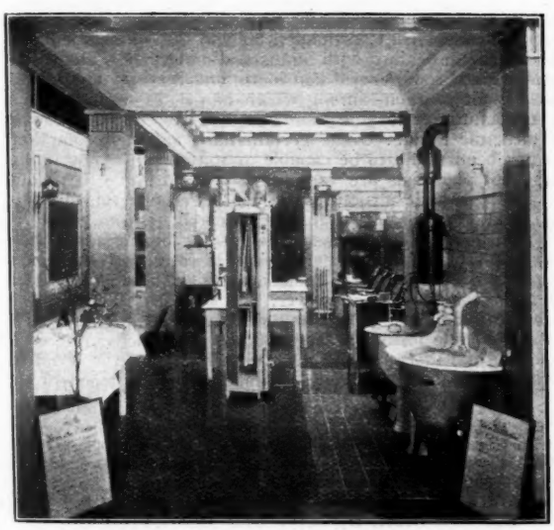
Many of the features which were referred to in detail in last week's issue of the "Journal," when describing the joint exhibit in the main hall at Olympia of the seven principal London and District Gas Companies, will be found reproduced in the accompanying photographs. These pictures convey a good idea of what is one of the best and most comprehensive displays to be found in the Ideal Home Exhibition of 1926.

"The Village of Open Doors."

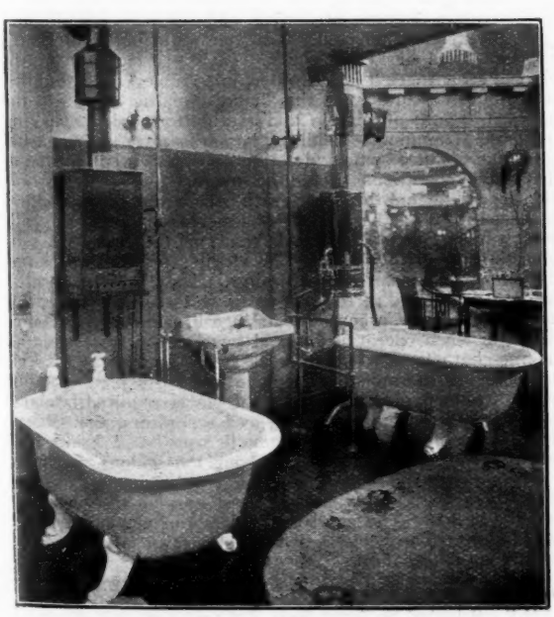
Extremely popular is "The Village of Open Doors," in which architects, builders, and engineers have combined to



The "Metro" Log Fire.



An Attractive Array of Kitchen Equipment.



Alternative Methods of Bath Water Heating.

"Metro Daylight" Mantles Illuminate the Hall.

Gas for Cooking, Water Heating, and Warming.

Messrs. Ewart's Stand at Olympia.

create a graphic review of a year's progress in home making; and, as one would naturally anticipate, the houses which attract most attention, among the nine of which it is composed, are well equipped with gas appliances. The "Lovell" house is fitted throughout by the Parkinson Stove Company, Ltd., of 129, High Holborn, London, W.C., with fires in each room and a cooker in the kitchen. An "Ideal" boiler is shown in the kitchen, for hot water supply. The "Novocrete" pavilion illustrates the uses of this new building material. It comprises a lounge and kitchen; the former with an attractive "Sentry" fire, by Messrs. Wood, Russell, & Co., Ltd., of 34, Oxford Street, London, W., and a "Sentry" boiler in the kitchen. "Sentry" gas fires and a "Sentry" boiler are also to be found in the Portable and Permanent Building Works' bungalow. An "Old World" cottage has been provided by the Davis Gas Stove Company, Ltd., of London and Luton, with a handsome "Carolean" gas grate in the lounge, an "Alpine" cooker in the kitchen, and a "Nautilus" boiler for the supply of hot water. In the study and one bedroom of the "Tibbenham" Tudor house are gas fires by Messrs. R. & A. Main, Ltd., of London and Falkirk; and there is a Main cooker in the kitchen. Another building—the "Universal" house—has central heating by the "Ideal" boiler, but there are one or two fires by Messrs. W. N. Froy & Sons, Ltd., of Brunswick Works, Hammersmith, W., and a gas cooker supplied by them. The "Dugdale Dennis" house has an "Ideal Cookanheat" cooker and boiler.

The exhibition continues to draw big crowds.

NOTES ON NEW BOOKS.

GENERAL CHEMISTRY.*

Excellent value for money is the thought which first springs to the mind on reading this interesting volume, which is an elementary survey of general chemistry emphasizing industrial applications of fundamental principles. Some books on chemistry take up element after element and compound after compound in a purely descriptive way, after the manner of a seed catalogue, but without the flowery language of the latter. Others chiefly emphasize applications of chemistry in the industries; others, again, are largely concerned with general principles. Even when the common ingredients of a book on chemistry are present in definite proportions, there are great differences in the manner of their intermingling. Some have a solution of general principles and industrial applications in descriptive chemistry as a solvent. In such books, mention of (say) phosphoric acid serves as a pretext for a discussion of the ionization of acids in stages; while copper ferro-cyanide perhaps occasions a dissertation on osmosis. In other instances the ingredients of a book have a lower degree of dispersion, and at times constitute a readily separable mixture. Now "General Chemistry," by Prof. Horace G. Deming, is essentially a flexible book. General principles are presented in separate chapters, and are not too completely scrambled with descriptions of individual chemical substances and applications to industry. Numerous cross-references link up the more theoretical portions of the text with descriptive material that furnishes illustrations of general principles. By sacrificing long accounts of such compounds as hypobromous acid, phosphoryl chloride, and so on, space has been gained for the development of such topics as hydrogen ion concentration and its applications, the chemistry of nutrition, electro-chemical principles, and the constitution of matter. The last-named subject—all too frequently left as a sort of afterthought—has been interwoven with the text so that the student examines oxidation and reduction, almost from the beginning, from the modern point of view. The sequence of the descriptive chapters is a common one, and material of secondary importance (the volume is one of over 600 pages) is in small type. The book was first published in 1923, and it is the Second Edition which is before us. In this edition recent developments in industrial organic chemistry—such as the direct synthesis of methanol and acetic acid, fermentation methods for the manufacture of butyl alcohol and glycerol, and the production of isopropyl alcohol from petroleum—are included; and the principles of electro-chemistry and the subject of precipitation are discussed more fully. There are no fewer than eleven appendixes to the book, one of which is a chronological list of noteworthy events in the history of chemistry, commencing in 500 B.C., and ending with the work of Lewis, Gilbert, and Newton in 1923.

* "General Chemistry" (Second Edition), by Horace G. Deming, Professor of Chemistry at the University of Nebraska. Published in America by John Wiley & Sons, Inc., and in England by Chapman & Hall, Ltd.; price, 17s. 6d. net.

THE BASIS OF MODERN ATOMIC THEORY.*

This volume provides a clear account of the general experimental and logical bases of recent atomic theories. The argument, which is mainly non-mathematical, goes back to Dalton's theory, from which point the subject is carefully reasoned, relevant experimental work being quoted at each step. Starting with the atom, the book deals in turn with the electron, electricity in gases, radioactivity, the electronic constitution of atoms, radiant energy, and atomic architecture. The final chapter, which is all too short, is headed "The Present Outlook." It contains a brief discussion on Einstein's theory of relativity, and calls attention to certain facts—such as the limits of applicability of the differential calculus and of the doctrine of energy built up in the system known as thermodynamics—which are seldom sufficiently emphasized. For example, the perpetual movement of molecules of matter is in conflict with thermodynamic principles. According to the latter, no contrivance exists for converting heat of uniform temperature into work. A ship cannot be propelled by cooling the sea; it must, in practice, work between two temperatures. A locomotive works between the temperature of the boiler and that of the condenser, and can convert into work a certain proportion of the energy received at the higher temperature. Yet a molecule appears to be able to take energy for movement from its surroundings by cooling them, in contradiction to the principle. This law of thermodynamics is, however, derived from experience on our own dimensional scale. If human beings were no bigger than bacteria, says Perrin, they might be able to catch hold of a molecule, and stop it, thereby having a means of converting heat of uniform temperature into work. The conclusion to draw, therefore, is that the principle of Carnot, while remaining true for magnitudes of which there is sensible knowledge, is inapplicable to the small dimensions encountered in dealing with atoms and molecules. The volume closes with a few general considerations relating to problems which await solution, among which one notes the question of the transmutation of the elements—the unrealized dream of the alchemic mind. Under certain hard and fast conditions, this has been found to be capable of solution in a few limited cases; but physicists are very far from being able to produce changes in atomic structures at will. Perhaps this difficulty may yield considerably to future research. From what has been said about this book—no attempt has been made to "review" it—it will be gathered that it could not be termed a "popular" work for the casual reader. Those interested in this universal question, however, will find in "The Basis of Modern Atomic Theory" a comprehensive account presented in a most readable form. A large number of selected references to the original literature are given at the ends of the chapters, which will be useful not only to students, but to teachers and other more advanced workers.

* "The Basis of Modern Atomic Theory," by C. H. Douglas Clark, B.Sc., D.I.C., Assistant Lecturer in Chemistry at the University of Leeds. Published by Methuen & Co., Ltd.; price, 8s. 6d. net.

CENTRIFUGAL DRYERS AND SEPARATORS.*

The construction and use of centrifugal machines closely concerns the gas engineer, who will find "Centrifugal Dryers and Separators" both interesting and useful. The author, E. A. Alliott, starts off boldly with the mathematics of centrifugal force and basket strength. In any discussion on the subject of centrifuges it is, of course, impossible to avoid mathematics; but the author of this handy volume has kept the theoretical treatment simple and straightforward. Speaking of sulphate of ammonia handling, he says that a 40-in. basket should take about 5 cwt., and a 48-in. 7 or 8 cwt. Two-and-a-half to five operations should be averaged over the whole week, depending on the speed with which the product flows into the basket and the amount of time taken up in neutralization, washing, &c. Mention is made of the Sturgeon self-discharging centrifugal, and the Hoyle and the Carpenter continuous machines, for coal drying. The Hoyle apparatus is said to deal with 15 to 40 tons of wet coal per hour, for 15 to 25 H.P. The Carpenter centrifuge has the merit of simplicity, and when operating on coal (washed slurry of a somewhat fine character), it is capable of treating about 40 tons an hour, reducing the moisture from 20 p.ct. to 7 p.ct. About 3½ p.ct. of fines pass through, and the power required is about 35 H.P. In the section on super-speed separators, the separation of water from water gas tar is considered briefly. A Sharples machine can deal with about 170 gallons an hour. The finely divided carbon acts as an emulsifying agent, and its density causes it to separate almost as soon as the liquor enters the basket. The emulsion is then easily separated into oil and water. The book is divided into seven chapters, and there are 39 illustrations.

* "Centrifugal Dryers and Separators," by Eustace A. Alliott, B.Sc., A.M.I.M.E. Published by Ernest Benn, Ltd.; price, 6s. net. (Chemical Engineering Library—Second Series.)

QUALITATIVE INORGANIC ANALYSIS.*

To many students this subject appears as a jig-saw puzzle, and is frequently considered a branch apart from theoretical knowledge. The object of this book is to make the subject a "live" one. While the information is for the most part commendably brief and simple, full details as to the exact procedure are given when necessary, particularly concerning those parts which the average student usually finds difficult. For example, stress is laid on phosphate separation, treatment of insolubles, &c. The book has been written to meet the requirements of students pursuing a course for Honours B.Sc. and A.I.C. examinations; and it is assumed that they have the usual general knowledge of Inter-B.Sc. standard.

* "Qualitative Inorganic Analysis," by D. R. Snellgrove, Ph.D., M.Sc., A.I.C., and J. L. White, D.Sc. Published by Methuen & Co., Ltd.; price, 7s. 6d. net.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Gas Production at the South Metropolitan Gas Company.

Sir,—Supplementary to my letter which appeared in the "Journal" for March 3, will you allow me to say that the average percentages of nitrogen and carbon dioxide in the gas supplied by this Company during the year 1925 were 6·7 and 1·5 respectively.

I may add that these figures are the results of some thousands of analyses.

Charles Carpenter.

South Metropolitan Gas Company,
709, Old Kent Road, S.E. 15,
March 12, 1926.

The Coal Report and the Smoke Problem.

Sir,—The insistence of the Coal Commission upon research, and more research, into the development of scientific methods for the use of fuel makes it clear that the Commissioners regard the old era of the coal industry as closed. We are no longer to consider that coal mining means finding and digging-up stuff that will burn, tossing it into a truck, and letting the consumer do what he likes with it. The treatment of the fuel in such a way as to get out of it the greatest advantage for the community, is to be the avowed object of the industry in the dawn that is to follow the darkness of the present depression.

One of the advantages anticipated from the more scientific treatment of the fuel problem is the riddance of smoke, even in great towns. The fact disclosed by the Commission's report that soot discharged into the atmosphere annually represents three days' output of all the mines in the country (employing over a million men) provides a simple but vivid illustration of the waste due to burning raw coal.

After years of research and experiment the way towards freedom from smoke is now pretty clear—smokeless methods in factories and smokeless fuel in domestic use. Hitherto we have always been waiting for something, and at the moment we are waiting for a fuel to take the place of about forty million tons of raw coal burned (in 1923) in domestic grates. Those who know tell us that if we want a smokeless fuel we have got to make it; and making forty million tons of anything is, of course, an industrial undertaking on a vast scale. It can only succeed commercially if the value of the products exceeds the cost of making them. That is, in brief, the position of the question of carbonization of coal at low temperature The question has claimed much attention, as such a system is needed for domestic use in addition to anthracite, coke, gas, and electricity.

At the recent Clean Food Exhibition at Hornsey, Mr. Neville Chamberlain [see p. 708] appealed to housewives to supplement the proposed Smoke Abatement Bill, and set an example which might be followed by local authorities. Housewives can do much, but not everything, without the help of husbands and landlords. Perhaps, in time, the Government itself might realize the possibility of putting its own houses in order.

What is now added as an inducement is that the coal industry of the country will be helped towards renewed success by attention to the proper use of fuel; and the use of fuel to make smoke is from now onwards to be regarded as improper.

Napier Shaw.

March 15, 1926.

Education Scheme—Examination, May 1.

Sir,—Now that the date of the Examination in Gas Engineering and Gas Supply is rapidly approaching, may I draw the attention of the 236 entrants, and others interested, to the Regulations governing the award of First Class and Second Class Certificates. These are set out in Clauses 13 and 14 (p. 11 of Green Book), and are as follows:

13.—In order to obtain a Second Class Certificate, a candidate must make not less than 60 p.ct. of the possible attendances in each year of the Course, and must obtain in the final year—

(i.) not less than 50 p.ct. of the possible marks in the Examination in Gas Engineering or Gas Supply;
(ii.) not less than 40 p.ct. of the possible marks in the Examination in each of the ancillary subjects;
(iii.) not less than 40 p.ct. of the possible marks obtainable for homework, class work, laboratory work, &c., taken separately, in each subject for which such marks are awarded under the approved scheme;
(iv.) not less than 50 p.ct. of the grand total of marks obtainable in the final year. Of this total the possible marks in the Final Examination should constitute not less than seven-tenths.

14.—A Certificate of the First Class will be awarded to a candidate who, having satisfied all the conditions, has obtained—

(i.) not less than 70 p.ct. of the possible marks in the Examination in Gas Engineering or Gas Supply;
(ii.) not less than 60 p.ct. of the possible marks in the Examination in each of the ancillary subjects;
(iii.) not less than 40 p.ct. of the possible marks obtainable for homework, class work, laboratory work, &c., taken separately, in each subject for which such marks are awarded under the approved scheme;
(iv.) not less than 70 p.ct. of the grand total of marks obtainable in the final year. Of this total the possible marks in the Final Examination should constitute not less than seven-tenths.

In other cases, the nature of the success will be indicated on the Certificate.

I may also take this opportunity of reminding the candidates for the Diploma that their theses must reach the undersigned by the end of the present month at latest.

As some misunderstanding has arisen regarding the relation of the Ordinary to the Higher Grade Examination for the purpose of passing to the Diploma, may I also point out to Higher Grade Gas Engineering students that there are three ways in which the Ordinary Certificate in Gas Supply may be obtained:

I. Such a student may take the Ordinary Grade in Gas Supply as a further one year's course; or
II. May attend a class in Gas Supply as a single subject; or
III. May sit as an external student for the Gas Supply Examination.

No Certificate in Gas Supply, however, will be awarded to any such student who does not take at least a final year's course in that subject; but a letter, signed by the Chairman of the Advisory Committee, will be issued to each candidate exercising either option II. or option III. set out above (and who attains First Class standard) certifying his success; and such letter will be accepted for the purpose of admission to examination for the Diploma in Gas Engineering as the equivalent of a First Class Ordinary Grade Certificate in Gas Supply.

The above arrangement applies equally, but of course inversely, to Higher Grade students in Gas Supply who wish to obtain the Ordinary Grade Certificate in Gas Engineering.

Walter Hole,
Organizing Secretary.

March 12, 1926.

Discussion on Mr. Shapley's Manchester Institution Address.

Sir—In your issue of the 10th inst. you report Mr. Shapley's Presidential Address to the Manchester District Institution of Gas Engineers, followed by the observations thereon of various engineers including myself. May I draw your attention to the fact that you have quite incorrectly reported the concluding paragraph of my observations, wherein you make me say: "Regarding concrete work, sometimes people specified so much aggregate to one bag of cement; but they should say cement in 10 bags to the ton, and not 12 bags, which one occasionally met."

What I actually stated was that I consider that the use of gauge barrows, in place of gauge boxes, for concrete work is excellent, but that their use should be confined to such occasions when undertakings carry out work themselves by direct labour, or by first-class contractors. Their use by unscrupulous contractors would be a great aid to alteration of the proportions of the component parts of the concrete. Incidentally, one finds that on occasions the ingredients of concrete are specified to be certain measures of broken aggregate and sand to one bag of cement. This latter, in my opinion, is a bad method of specifying. Cement should be specified to be gauged in gauge boxes; otherwise, if bags are specified, or allowed, then the engineer should see whether the bags of cement delivered on the site weigh out at 10, 11, or 12 to the ton.

As the sense of my observations on this matter has been deleted, I should be much indebted to you if you would insert this letter in correction.

A. L. Jennings.

Gas-Works, Cleckheaton,
March 11, 1926.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Petitions against Private Bills.

A petition has been deposited on behalf of the Stourport Gas Company against the Kidderminster and Stourport Tramways Bill. The Newcastle-upon-Tyne and Gateshead Gas Company are petitioners against the Newcastle-upon-Tyne Corporation Bill.

Special Orders.

The following Gas Orders have been referred to the Special Orders Committee: Rowley Regis and Blackheath Gas Company, Midhurst Gas Company, Ltd., West Bromwich Corporation, and the Ilkeston Corporation.

The Bideford, Carlisle, Newark, and Solihull Gas Orders, 1926, were approved on March 10, on the motion of Viscount Peel. A similar resolution was moved by Sir Burton Chadwick in the House of Commons and agreed to.

Smoke Abatement Bill.

A Bill to amend the law relating to smoke nuisances and for other purposes was presented by the Earl of Onslow last Thursday, and read the first time.

HOUSE OF COMMONS.

Gas Regulation Act.

Copies were presented of drafts of Special Orders to be made by the Board of Trade under the Act, on the application of the Rowley Regis and Blackheath Gas Company, West Bromwich Corporation, Ilkeston Corporation, and the Midhurst Gas Company, Ltd.

Low-Temperature Carbonization.

Replying, on Monday of last week, to Mr. G. Hall, the Secretary for Mines (Colonel Lane Fox) said it was impossible within the limits of an answer to a question to give an account of the progress made in low-temperature carbonization of coal. A full progress report was being written for publication with the annual report of the Fuel Research Board. Several commercial plants, of different types, had started working during the year, and others were approaching completion. It was too early yet to form an opinion as to their success.

REGISTER OF PATENTS.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for March 3.]

Nos. 4970-5625.

Coley, H. E.—"Low-temperature carbonization." No. 5290.
Holder, W. E.—"Gas, oil, &c., cooking appliances." No. 5576.
Mulholland, J.—"Incandescent gas fires." No. 5405.

[Extracted from the "Official Journal" for March 10.]

Nos. 5626-6339.

Dixon, L.—"Appliance for use with gas cookers." No. 6085.
Drake, J. W., and Drakes, Ltd.—"Apparatus for treating coke discharged from retorts, &c." No. 5663.
Falk, H., and Falk, Stadelmann, & Co., Ltd.—"Inverted incandescent gas burners." No. 6038.
Helps, G.—"Gas burners." No. 6284.
Henshaw, D. M.—"Separation of tar and ammonia from gases." No. 6231.
Holmes & Co., Ltd., W. C.—See Henshaw, D. M. No. 6231.
Kidston, R.—"Gas heating apparatus." No. 5688.
Krupp Germaniawerft Akt.-Ges., F.—"Waste-gas steam boilers." No. 6273.
Laing, B.—"Distillation of carbonaceous materials." No. 6337.
New Stimex Gas Stove Co., Ltd.—See Dixon, L. No. 6085.
Nielsen, H.—See Laing, B. No. 6337.
Parker, J.—See Henshaw, D. M. No. 6231.
Suffern, E. S.—"Generation of gas." No. 6119.
Young, G. E.—"Gas heating apparatus." No. 5688.
Zeche, M. Stinnes.—"Process for obtaining phenols from ammoniacal liquor, &c." No. 6234.

MISCELLANEOUS NEWS.

LEA BRIDGE DISTRICT GAS COMPANY.

Annual General Meeting.

The Annual General Meeting of the Company was held on Tuesday, March 9, at the Offices, 63 and 64, Chancery Lane, W.C.—Mr. A. M. Paddon (the Chairman) presiding.

The Secretary (Mr. Henry Hand) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, remarked that the financial statements of most of the gas undertakings in the Metropolitan area had now been disclosed with respect to the period in common with that which they had now to consider; and of all those that had come under his notice, whether he was responsible for them or interested only as a shareholder, he did not know any that were quite so good as those which it was his privilege to present to the proprietors at that meeting. He might say, having very carefully and conscientiously gone through all the figures, that there was not one adverse feature in this statement to which it was his duty as Chairman to draw their attention. There had been a moderate increase in the dimensions of the business; and it had come about in such a way as they had been able to deal with economically. There had not been those large and disturbing developments that had characterized the gas supply in so many other directions at the close of the year. Throughout the twelve months the Company had maintained the comparatively low price of 9½d. per therm with which they began it; and in this price there was only a very trifling difference between what they charged and the price of their all-important neighbour who practically encompassed them. The only other company on their borders was one with whom they could compare favourably in this regard.

FAVOURABLE CAPITAL POSITION.

Turning to the accounts themselves, it would be gathered that the capital account itself was a little involved, if they estimated its relation to their business. While they had actually received in capital £420,863, this was subject to the qualification that a sum of £30,242 was added on conversion, reducing the amount of capital that had really been received for the purposes of the undertaking to £390,621, which was equivalent to the very low rate of £452 per million c.ft. of gas. But there was another way of looking at this question. They were over-spent in regard to capital to the extent of nearly £14,000, so that the total expenditure stood at £434,428; and based on this the capital expenditure would be a little over £500 per million c.ft. But again the deduction of capital added on conversion had to be made; and this brought out a figure of £468 per million c.ft., which was perhaps the best criterion to adopt. The proprietors would, however, recognize that any one of these figures, arrived at in the respective ways that he had referred to, was something indicating a very low amount of capital used by the Company for the purposes of their business.

FEATURES OF THE REVENUE ACCOUNT.

Coming to the revenue account, and taking first the credit side, they had sold some 26 million c.ft. more gas; and the receipts for this, in conjunction with the rental of meters, stoves, &c., gave them an increase for the year of £6417; but by the general depreciation in the receipts from residuals, this had been completely wiped-out by a loss of £6999. So that they left the credit side of the account with the receipts, as compared with a year ago, reduced to £550. When, however, they turned to the other side of the account, they found some rather extraordinary figures. Coal had cost £3000 less, notwithstanding the increase in the business. Oil had cost nearly £2000 more; and coke, by reason of the fall in its value, cost less by about the same amount. Thus for all the materials used in the manufacture of gas they had had to pay £3340 less. The next interesting item was that of carbonizing wages, which stood at the very low figure of 2·84d. per 1000 c.ft. of gas. When they came to consider the final result of the trading, it was as well to remember that there had been spent during the twelve months under review over £3000 more upon repairs and maintenance of works and plant—a figure which would tell the proprietors that any profit which was arrived at had been thoroughly well earned. As a matter of fact, the total charges for repair and maintenance were just under 18d. per 1000 c.ft. The account was debited with an increased amount of £1700 for rates and taxes; and he was afraid that this was only an earnest of further disabilities to come. But the revenue account carried an appropriation of £1666 to the benefit fund, and £1700 to the special purposes fund, as well as £2388 to the co-partnership fund. When all these disbursements had been made, the total expenditure was only £188 more than a year ago. The profit was £738 less; and the difference between these two amounts balanced the £550 deficit on the income side.

A GRATIFYING STATEMENT.

Glancing at the profit and loss account, it would be seen that, in addition to the apportionments to which he had referred in the revenue account in supplementation of their funds, they also proposed to carry £2000 to the reserve fund. There was brought into this account £17,085, and they were carrying forward £20,391, so that the position had improved by £3307. It would doubtless be agreed that these figures comprised a very satisfactory statement of account with regard to the undertaking; and he thought that considering them in the aggregate would justify the claim that these accounts, taken in their entirety, were perhaps the most favourable presented in connection with any Metropolitan undertaking for the

same period. There was no need for him to refer to the subsidiary accounts beyond pointing out that while, as he had already said, they had transferred from revenue account to the benefit fund the sum of £1666, the withdrawals from this account for the year amounted to only £770. Thus the position of the benefit fund had been very much strengthened by what was far more than a normal contribution for the period under review. In the balance-sheet, too, there was one item which rather favoured this undertaking. The reserve fund £28,778, special purposes fund £15,276, and benefit fund £6233 were invested very closely indeed up to their nominal amounts; and the total value of the investments was shown at £43,957. In addition to this, they had on deposit with their bankers the sum of £19,000. Taking all these factors together, they might fairly congratulate themselves on their position; and he only wished that in many other directions in which he was similarly responsible things were half as good.

THE FUTURE.

With regard to the future, he might say that theirs was a very steady business. If it did not experience sensational increases, it very seldom had to record a decrease in respect of any completed period of account; and the small, but satisfactory, increase referred to in the present report went steadily on into the current year. Their business struck its roots down deeper and deeper among what he might term the less affluent elements in the community; and in so far as a gas company did this, the better it was for its prospects and its prosperity. The greater proportion of the consumers were on the prepayment system of supply; and the greater proportion of the gas they sold was so taken. These people well understood the value of gas. They did not waste it; and it represented a very definite facility and economy to them which they would not lightly give up. On those building estates which were adapted to the requirements of people of moderate means and regular employment, those who were responsible adopted the universal use of gas. The Company had evidence of this before them. The use of electric light was, as a rule, limited to those municipal undertakings where there existed certain æsthetic ideals which did not exactly correspond with the purses of those who now occupied the houses to which he had referred; and in that case, of course, there was some competition with electricity. Probably many of the proprietors would have been concerned over the electricity proposals of the Government; but these had already been discussed at so many meetings that it was not necessary for him on that occasion to refer to the matter at great length. But it would be realized that if electric competition of a formidable character was to be derived from a large number of central stations, operating on a big scale, then the case of their own Company was desperate ten years ago; for they were in the midst of such. They were not far from one which some years ago was quite willing to take over the whole Metropolitan supply; and they were also not far from other huge stations. So he did not think they had anything to fear from these so-called super-power stations. Probably after the Government had had some little experience of them they would apply another name. In their own district the supply of electricity was undertaken by the two Municipalities; and they could either furnish electricity generated by themselves or they could take advantage of those dazzling facilities which could be had at a trifling cost per unit from these large stations. They had had this opportunity for a long time. It had not reduced the Company's business, and he did not think it would. If there was any just cause for apprehension—and he believed there was—it was rather on the part of those electrical undertakings that were going to have all the advantages foreshadowed inflicted upon them against their will. Those undertakings might consider their prospects precarious; but he did not think there was anything to disturb gas suppliers either in the immediate or the distant future, so far as it had been disclosed.

The DEPUTY-CHAIRMAN (Mr. G. W. Carey) seconded the motion, which was unanimously carried without discussion

DIVIDEND, RE-ELECTIONS, AND THANKS.

On the proposition of the CHAIRMAN, seconded by Mr. J. M. MILES, dividends were declared at the rates of 5 p.ct. per annum and 6 p.ct. per annum on the preference stocks, and 6¾ p.ct. per annum on the consolidated ordinary stock, all less income-tax.

The CHAIRMAN proposed the re-election of Mr. E. L. Burton as a Director of the Company. He said that Mr. Burton, who succeeded their old friend Mr. Phillips, had not been with them on the Board very long; but he had amply justified every anticipation. Not only did he possess exceptional knowledge of gas accountancy and the technique of everything connected with gas finance, but he had also had a very long and distinguished career as an executive officer, and was a successful Director of other gas companies.

The DEPUTY-CHAIRMAN seconded the proposition, which was agreed to.

The retiring Auditor (Mr. H. C. Burton) was re-appointed, on the motion of Mr. L. TREWBY, seconded by Mr. C. CHAMBERS.

Mr. W. B. FARQUHAR proposed a hearty vote of thanks to the Chairman and Directors for their services to the Company. He remarked that he had attended other meetings of gas companies during the past fortnight; but he did not think he had heard another statement that equalled the one just put before them by their Chairman. The proprietors were to be congratulated upon possessing a Board who could present such a set of figures.

Mr. A. W. OKE, in seconding the vote (which was unanimously passed), remarked that the Chairman had not mentioned the successful issue of £30,000 of 6 p.ct. preference stock, at an average price of £102 12s. 9d. p.ct., which was a very good result. Not only did the proprietors enjoy a good dividend, but the consumers received gas at a reasonable rate.

The CHAIRMAN, after returning thanks, moved a similar vote in recognition of the services of the officers, staff, and employees of the Company. He pointed out that Mr. F. W. Cross, who notably had been the architect of whatever success the Company enjoyed, was not with them that day. For over thirty years Mr. Cross had looked after the undertaking with assiduous care and very great skill; and he was now enjoying a well-earned holiday. As Secretary, Mr. Hand was the very best possible man for their purpose. In the absence of their Chief, the engineers at the works were doing excellently well; and the good spirit shown by the co-partners generally was responsible to a great extent for the gratifying position of affairs which had been revealed that day.

Mr. CHAMBERS seconded, remarking that he knew both Mr. Cross and his son, and was aware how well the work was done at Lea Bridge. Such results could be brought about only when there was perfect harmony between all concerned.

Mr. HAND, in the course of his acknowledgment, read the following extract from a letter which he had received from Mr. Cross: "In replying for the staff at the next week's meeting, will you please convey to the stockholders that, in the taking of my long holiday, it has added greatly to my comfort, my peace of mind, and my pleasure that I have absolute confidence in the unbounded loyalty to the Company and to myself of every member of the staff, and that I also feel the Company's workmen are comfortable in the thought that the Board of Directors are considerate of their happiness and comfort in every respect possible."

Mr. D. CLEAVE CROSS also replied, on behalf of the technical staff and the men at the works. He said the good feeling existing was extraordinary, and everyone was working for the benefit of the Company.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette," the following notices regarding applications to the Board of Trade under the Act.

SPECIAL ORDER.

Burgess Hill and St. John's Common Gas Company.

To authorize the Company to use scheduled land for gas-works purposes, to raise additional capital, and for other purposes.

DECLARATIONS OF CALORIFIC POWER.

Finedon Gas Company, Ltd.—500 B.Th.U. (April 12.)

Hindley Urban District Council.—425 B.Th.U., in substitution for 475 B.Th.U. (July 1.)

Nuneaton Gas Company.—200 B.Th.U. (June 13.)

Wokingham Corporation.—460 B.Th.U. (June 15.) In last week's issue, "Wokingham" wrongly appeared as "Workington." The Borough of Workington are not yet operating under the Gas Regulation Act.

THE DEVONPORT GAS AFFAIR.

Proceedings Decided Upon.

After hearing a letter from the Director of Public Prosecutions (Sir Archibald H. Bodkin), the Plymouth Town Council on Monday, March 8, decided to institute proceedings against those concerned in the recently reported alleged irregularities in connection with the Devonport Corporation gas undertaking.

Sir Archibald Bodkin, who had had the papers relating to the matter laid before him, on behalf of the Corporation, says in the course of his reply, after remarking that he does not think the public funds which are at his disposal should be utilized in undertaking a prosecution which would relate to purely local matters:

> I am strongly of opinion that, in regard to such action as the present, it is expedient, and in the interests of the area affected, that the public administrative body, who are the employers, should indicate by their action that their servants being discovered in dishonesty must expect to be prosecuted—and by their employers—for any grave breach of their duty and fidelity which they are paid to carry out and owe to their employers, and which may constitute a contravention of the criminal law.
>
> In these circumstances, I consider that it would be proper for the Corporation, through their executive officer, to request the Chief Constable to take such action as may be considered on legal advice open. I also am of the opinion that, even if no such request be made, it is fully competent for the Chief Constable to act by virtue of his independent office, should he consider, after taking such advice as he may desire, that criminal proceedings would, on the material available, be justified.

Mr. R. H. BAKER moved, at the conclusion of the reading of the letter by the Town Clerk: "That the Chief Constable be instructed to prosecute those people concerned in the malpractices of the Gas Department." Mr. Baker said he did this in common fairness to the individuals concerned, as they had been torn, tried, and persecuted, and many worse crimes than they were capable of committing had been tacked-on to them. He believed the fairest and kindest thing they could do in that Council was to hand them over to the tender mercy of the law, which said people were innocent until they were proved guilty.

Alderman CHURCHWARD formally seconded; remarking that he did not think any discussion ought to take place.

At the request of Mr. LOVELL DUNSTAN, the word "immediately" was inserted in the resolution, which was passed unanimously without further debate.

L.C.C. and Gas Poisoning.—At the March 9 meeting of the London County Council, the "carbon monoxide" question was raised by the Earl of Haddo, who was informed by Mr. Cyril Jacobs (the Chairman of the Public Control Committee) that the question of protecting gas users was one for the Board of Trade, who were closely investigating the whole subject. During 1925, in the areas of the three London Gas Companies, there were 27 deaths from gas poisoning involving an open verdict or verdict of "Accidental death."

GAS LIGHT AND COKE COMPANY.

Application for Increase of Standard Price.

The first application made by a gas undertaking for an Amending Order to increase its standard price, under the proviso to section 1 of the Gas Regulation Act, was that of the Gas Light and Coke Company, which was the subject of inquiry by Mr. J. F. RONCA (Director of Gas Administration) at the Board of Trade offices on Monday, March 8. The application was to increase the standard price from 11d. to 11·4d. per therm. There was opposition by the London County Council, who did not oppose the increase of 0·4d. per therm, but disagreed with the method of calculation by which the figure was arrived at. The Willesden Urban District Council also opposed. Opposition by the Middlesex County Council and the West Ham Corporation was mentioned, but no representations were made verbally on behalf of these bodies at the inquiry.

The Gas Light and Coke Company were represented by Mr. H. P. MACMILLAN, K.C., and Mr. W. E. TYLDESLEY JONES, K.C.; the London County Council by Mr. ROWAND HARKER; and the Willesden Urban District Council by Mr. VILLIERS BAYLY.

Mr. MACMILLAN said that the Company's pre-war standard price was 3s. 2d. per 1000 c.ft., which was fixed in 1909, and was equivalent to 7·6d. per therm. By an Order of 1921, under the Gas Regulation Act, the standard price was fixed at 15·2d. per therm, and in January, 1924, following an application by the London County Council for a reduction, in view of decreased costs, the standard price was fixed at 11d. per therm. The increase to 11·4d., which was now asked for, was justified by reason of increased costs resulting from circumstances beyond the control of, and which could not have been avoided by, the Company. The present position, said Counsel, was curious, inasmuch as the application for an increase was not opposed by the London County Council or any of the other local authorities concerned, on its merits; but the County Council did not agree with the Company's method of calculation, or with their figures. It was noteworthy that there were 44 local authorities within the limits of supply of the Company, all of whom were interested and had a *locus* to come forward and object to the proposal. The Company had received communications from 23 or 24 of them. Seventeen of these had given notice of objection, but had since withdrawn, or were no longer appearing, with the exception of the Willesden Urban District Council. The Middlesex County Council and the West Ham Corporation, as well as the London County Council, did not object on merits, but did not wish to be taken as assenting to the method of calculation or the figures involved in it. The justification for an increase of the standard price was a substantial alteration in costs; and it was manifest that the ascertainment of the alteration, which must be shown to have occurred, necessarily involved comparison. Inasmuch as the object of the comparison was to ascertain whether the present standard price was too high or too low, the comparison must be between the costs and charges obtaining when the present standard price was fixed, and those which would operate in the immediate future, when the new standard price would apply; and the alteration shown by the comparison was to reflect itself in a corresponding alteration of the powers of charging authorized by the original Order. The comparison must be between the circumstances prevailing when the standard price was last fixed and at the present time. What the Company had done in order to establish the alteration in costs and charges was to institute a comparison between the figures in the schedule on which the standard price of 11d. was fixed, in 1923, and the estimated figures for the future year, in which the new standard price would operate. There must always be a difficulty in these matters, for the reason that the Board of Trade, no doubt rightly, did not disclose to the parties the principles on which they proceeded in arriving at the standard price; and they were not called upon to do so. Therefore, no one could tell precisely how the Department had proceeded when the price of 11d. per therm was fixed; and the Company could only infer that it was fixed upon the figures in the schedule they had submitted. If a comparison of the figures put forward in 1923 and those submitted to-day showed that there had been an increase in the costs of production and supply, the Company were entitled to an increase in the standard price in respect of this. In any event, the comparison could not start with the costs and charges obtaining on June 30, 1914, which the County Council's method involved. The 1914 figures had played their part once and for all when the price of 15·2d. per therm was fixed by the original Order in 1921. Counsel submitted, however, that it was not material, for the present purpose, to determine which was the correct method, inasmuch as the parties were in agreement as to the new standard price. It was not an uncommon proceeding in a Court of Law for parties to say that they were at variance as to method, but were at one in result. In that state of affairs it would be unheard-of for a Judge to say he was so interested in the question of interpretation that he would like both sides to argue it out, though the result would be the same.

Mr. RONCA pointed out that the Board of Trade had to be satisfied in this case upon the merits of the application.

Mr. MACMILLAN said there could be only two or three different views as to the method of comparison to be made under section 1 of the Gas Regulation Act for the purpose of establishing the substantial alteration in costs; but if the Board of Trade were satisfied that by all the possible methods the same result was achieved, they were entitled to say that it was not necessary to select or to put the seal of the Department's approval on any one of those methods at this stage, and that would leave the question of the right method until the time when it became material. The Board of Trade were concerned to ascertain whether the proposition put forward was a fair one; and if it were demonstrated to be fair, then they were bound to give effect to it. It would be academic for Mr. Ronca to say that he wanted the matter argued now. The attitude of the London County Council was one which the Company did not in any way resent. He referred to a letter written by the Council to the Board of Trade, in December, 1925, stating that they were advised that the increase of standard price proposed by the Company would probably be justified in the present circumstances, though it appeared that the economic conditions which were likely to prevail in the not distant future might necessitate an early reconsideration of the matter if the proposed standard price be allowed. At the same time, they were of opinion that the method adopted by the Company in arriving at the increased cost of supply was not a proper one, seeing that it involved the comparison merely of an estimate of the present cost of supply with an estimate of the cost of supply in 1923, prepared by the Company for the purpose of arriving at the standard price. The Council did not agree with the Company's figures of present costs, and pointed out that no allowance was made for reduction in cost due to increased output. The inference to be drawn from that letter, said Counsel, was that the County Council, disagreeing with the Company's method and figures, had applied themselves independently to the question of seeing whether there had been such an alteration as to justify the increase. He knew of no other methods beyond that adopted by the Company and that of the County Council, which latter involved reference to the 1914 figures; and it must mean that the new standard price could be justified on their method. The County Council also pointed out in their letter that they did not wish anything that happened in the present case to prejudice them in future cases, as to the method which should be employed. The same attitude was also adopted by the Middlesex County Council and the West Ham Corporation. It must be assumed that all these opponents had investigated the figures by their own methods, and had arrived at the same result as the Company by independent investigation. He knew of no better proof that the figure was justified. He put the case forward as an exceptionally satisfactory one from the point of view of the Board of Trade. With regard to the Willesden Urban District Council, in their letter they were singularly reticent. They pointed out that the Company supplied the whole of their district, and said that the Order now sought was onerous, and against the interests of the consumers.

Mr. VILLIERS BAYLY said he saw no ground for the granting of the Order.

Mr. MACMILLAN remarked there need be no anxiety on the part of the local authorities opposing that anything said or done at the present inquiry would pre-judge the position of any of them on this question of principle at future inquiries.

Mr. HARKER then indicated some of the main points of the County Council's case. He pointed out, however, that his observations must not be taken as suggesting to Mr. Ronca any formula which it would be proper or possible for him to adopt in any one of the cases which came before him, because it might be that a formula applicable to one company might not be applicable to another. The first, and perhaps the most important, point on which the County Council differed from the Company in principle was in regard to the quantity of gas sold, which was used as the divisor in arriving at the price per 1000 c.ft. In the schedule which was presented by the Company in 1923, when the standard price was fixed, the quantity of gas sold, in thousands of cubic feet, was 32,490,600; and this figure was contained, for the purpose of comparison, in the schedule now submitted. The quantity sold for the year to December, 1924, was 36,504,917. When, however, the Company came to give figures for an estimated future year, in which the new standard price would operate, they had taken, as a divisor, in order to arrive at the price per 1000 c.ft., not the amount of gas sold during the last known year, but the quantity given in the estimate for 1923, which was smaller. The County Council suggested that the figure taken as the divisor should be the quantity sold in the year ended Dec. 31, 1925. He made the reservation, however, that the Company should benefit by any increase in the amount sold due to circumstances within their control. One aspect of the matter which had occurred to the County Council was that the Company had spent a good deal of money on advertising. There was the question of whether or not they were entitled, in their calculation, to the benefit of any increase in output due to their advertising propaganda. He said this for the reason that they had charged, in their cost of manufacture, the money spent in obtaining so much of the increased output as was attributable to advertising. The second point was that the County Council did not assent to the proposition that the correct comparison to make was the comparison of the present cost with the estimated cost at the time the present standard was fixed, for the reason that neither party knew at what figure the Board of Trade had fixed the cost when they had revised the standard price in 1923. The Company had compared their estimate for a future year with the estimate they had given to the Board of Trade in 1923. The County Council had also given an estimate in 1923; but how far the Board had accepted any particular item in the County Council's or the Company's estimate, they did not know. The proper comparison would be between the actual costs of production of supply of gas in 1925 and the actual costs at the time the 1923 application was made; and the Company should satisfy the Board of Trade that if there was any difference between the 1925 figures and their estimates, that difference was due to abnormality.

Mr. MACMILLAN asked Mr. Harker if he would conclude his statement by saying that, upon this method, the figure of 11·4d. per therm was justified.

Mr. HARKER said he would.

Mr. *D. Milne Watson* (Governor of the Company) then gave evidence, and corroborated the statement made by Mr. Macmillan as to the standard prices fixed from 1909 upwards. In the schedule of costs prepared for the purposes of this case present-day estimated costs were compared with the costs given in the schedule prepared in 1923. This 1923 schedule must have been accepted by the Board of Trade, because the figure of 11d. per therm, the standard price fixed by the Board, was the figure which that schedule justified.

Mr. RONCA said that, though the figure was the same, it did not follow that the method was the same.

Witness said that one factor in the increased costs as between 1923 and the present time was the serious decrease in the prices of residuals. In the 1923 schedule, the price taken for coke was 27s. 3d. per ton, and the figure in the present schedule was 22s. 6d. Even this seemed to be on the high side, because the December half-year's figures were lower than this. Again, tar in 1923 was 4d. per gallon, and in the present schedule it was 3d.; but this again was too high, because in the second half of last year the price received was only 2·58d. The price of sulphate of ammonia had been reduced from 6·2s. to 3s., and he had heard recently that the price was likely to be still lower in the near future. There was an enormous amount of synthetic ammonia produced. As to oil, from which the Company made a good deal of gas, the price in 1923 was 3·6d. per gallon, and the last figure in December, 1925, was 4·33d., the figure in the schedule being 4·25d. The other important factor affecting the increased cost was that of wages. There had been two advances of ½d. per hour since 1923 (one in January, 1924, and one in January, 1925). This worked out, roughly, to an increase of 8 p.ct. in wages. There were also increases to the engineering staff. The increased cost of production, due to the fall in prices of residuals, was 1·23d.; and the increment due to increased wages was 1·03d. per 1000 c.ft.—making a total increase of 2·26d. per 1000 c.ft. In arriving at this figure, however, he had taken prices for residuals which he could not realize during the coming year. He was asking, however, for an increase of only 2d. per 1000 c.ft. in the standard price.

This completed the Company's case.

Mr. VILLIERS BAYLY then submitted that the evidence put forward by the Company wholly failed to satisfy the terms of the proviso of section 1 of the Gas Regulation Act, to enable the Board of Trade to make an amending Order. To obtain a revision of price under the terms of the proviso to section 1 of the Act, it was not sufficient to say that the cost of manufacture had gone up, because of the decreased price of residuals and increased wages. Before the Act was passed, the standard price, in so far as it was fixed at all, was fixed by Parliament, and could only be varied by them. The number of instances in which it was varied by Parliament was small; and in these instances there were special circumstances. He submitted that the fixity of the standard price was perpetuated by the Gas Regulation Act. Before the Act was passed—and he was entitled to say that it was the reason for its being passed—a number of companies had asked for a revision of their standard prices; and a commission had sat to inquire into it. The reason for the Act was that the war had so changed the conditions that some alteration had to be made. The Act provided that the existing price should be translated from a price per 1000 c.ft. to a price per therm, and an amount added to meet the increases (if any) due to "circumstances" beyond the control of the undertakers. The "circumstances" were those which had arisen due to the war. He held that the reasons put forward by the Company as to why their standard price should be increased now were not "circumstances" within the meaning of the Act. They had to show that the increase in cost was due to some "circumstances"—such, for instance, as Government prohibition of the use of sulphate of ammonia as a fertilizer.

Mr. RONCA asked what distinction Counsel would draw between this and the circumstances that the output of synthetic ammonium nitrate, by an entirely different process, had been so great as to reduce the price of sulphate of ammonia produced by the Company.

Mr. BAYLY replied that if this was to be the basis of the application, and if it was borne out, the Company would have made out a case. In the present case, however, the Company were relying merely on an increase in figures. It was begging the question merely to say that the "circumstance" was an increase of costs. The increase must be due to some "circumstance."

Mr. MACMILLAN, replying, wondered if Mr. Villiers Bayly appreciated the fact that the "circumstances" utilized by the local authorities in 1923 for the purpose of obtaining a reduction of the Company's standard price from 15·2d. to 11d. per therm were the very circumstances which he now said should be eliminated from the Board's consideration. He did not follow the argument that market fluctuations in the commodities with which the industry dealt, and variations in the labour charges necessary for the production of gas, were to be eliminated when considering whether or not there was a substantial alteration in the cost of production. The Company had concentrated on the fluctuations in the net cost of the raw material and in labour charges—the circumstances beyond the Company's control which the Legislature had in contemplation. There had been no cross-examination on this; and he submitted that the Board had material on which to grant the Company's application.

SOUTH SUBURBAN GAS COMPANY.

Standard Price Revision.

The inquiry by Mr. J. F. RONCA (Director of Gas Administration at the Board of Trade) into the South Suburban Gas Company's application for a Special Order under section 10 of the Gas Regulation Act, fixing a new standard price, was resumed on Monday, March 8. The earlier proceedings were published in the "JOURNAL" for March 10, p. 631.

Continuing his cross-examination of Mr. *George Evetts* (the Engineer advising the Company), Mr. ROWAND HARKER, for the London County Council, directed attention to the point made by Mr. Evetts that the standard price should be fixed so that the Company could pay a dividend of 6½ p.ct.; the view of the County Council being that it should be 6 p.ct. It had been stated that the pre-war selling price was 2s. 3d. per 1000 c.ft., the standard price being 2s. 9d., and the dividend on the 5 p.ct. standard stock 6 p.ct., but that, if the war had not intervened, they would have effected savings which would have reduced the selling price to 2s., and would have increased the statutory dividend to 6½ p.ct. Mr. Harker's questions were directed to show that the pre-war selling price of 2s. 3d. was uneconomic, and should have been increased; and that consequently the figure of 2s. should be correspondingly increased. He pointed out that the Company did not earn enough in the year ended June, 1914, by £14,493, to pay the statutory dividend of 6 p.ct. The £14,493 was equivalent to 1·64d. per 1000 c.ft.; and therefore the economic price should have been 2s. 4·64d.

Witness said it was not quite so much as 1·64d., because one-seventh of any saving effected went to the shareholders, and therefore one-seventh had to be deducted as the shareholders' deficit.

Mr. HARKER went on to point out that, in the year ended June, 1914, the amount of money spent on repairs and maintenance of works was abnormally low; the difference between the average of the ten pre-war years and the actual figure for that particular year being equivalent to 1·54d. per 1000 c.ft. If that were added to the 2s. 4·64d., the economic selling price became 2s. 6·18d.

Witness said it was not quite this, because in previous years they might have spent less on repairs, and would have had a reserve to spend on repairs in the year ended June, 1914.

Mr. HARKER replied that it might be that whatever money the Company had saved in the earlier years would have been spent by the end of the ninth year, in which case the amount spent in the year ended June, 1914, would still have been abnormally low.

Witness (answering the point that in 1910 and 1911 the Company had sold at a price higher than the economic price) said that any undertaking could not avoid selling above the economic price in one year and below it in another; and it was a physical impossibility so to balance the figures that in any year the consumer paid only the actual cost. He could have come to the Board of Trade with a straight application for a price to enable the Company to pay a dividend of 6½ p.ct., which was not unreasonable, and without attempting to prove any justification except the state of the market and the general position of the gas industry to-day. Instead of that, however, he had tried to show that it was not unreasonable to assume that the Company would have been able to pay 6½ p.ct. had the war not intervened; and, in order to prove this, he had had to forecast a line of circumstances as he conceived they would have happened.

As to the question of whether or not it was correct to take into account the cost of future capital when fixing the standard price, Mr. TYLDESLEY JONES, for the Company, pointed out that, since the war, in the case of any Bill fixing increased charges for water companies, the new capital required was always put before the Parliament Committee dealing with the Bill. Referring to a table which had been prepared on behalf of the County Council showing the dividends authorized, paid, and earned by the Company in the years 1904 to 1913, Mr. Tyldesley Jones said it showed that in 1911 the Company were earning £6 9s. 10d. p.ct., which was practically 6½ p.ct. That was the year preceding the amalgamation with the Bromley and West Kent Companies. The expenses for 1912, however, included £21,490 for compensation to retiring Directors, &c., which was equivalent to £1 19s. 6d. p.ct. on the ordinary capital; and if this were added to the dividend actually earned in 1912—namely, £4 18s. 5d. p.ct.—the dividend earned would have been £6 17s. 11d. At the same time, the price of gas was then being reduced, the effect of which would be to increase consumption. He considered the table to be the best confirmation of the Company's case. He then produced a table which showed the result of the agreements arrived at by the Company and the County Council after the discussions at the inquiry. The Company's figure for the net cost of supply of gas was 41·97d. per 1000 c.ft., and the County Council's figure was 41·65d.—a difference of 0·32d. per 1000 ft. Of this, 0·06d. represented increased national insurance payments, and 0·26d. was in respect of increased co-partnership payments, both of which were now agreed by the County Council, so that the Company's figure of 41·97d. was accepted. It was stated that, if the dividend of 6½ p.ct. was conceded by the Board of Trade, instead of the 6 p.ct. suggested by the County Council, the effect on the consumer would be ½d. per 1000 c.ft., or 0·11d. per therm.

Mr. *John Terrace* (Chief Engineer to the Company) gave evidence with regard to the works and plant. The manufacturing capacity, he said, was 14,550,000 c.ft. per day. Last winter the whole of the plant had been in use, from the beginning of December. On three occasions the average demand for seven consecutive days was 14,432,000, 14,374,000, and 14,635,000 c.ft. respectively; so that for one whole week the capacity of the works had been exceeded. The maximum daily sale was 15,357,000 c.ft. It was clear that the works were not of sufficient capacity properly to maintain the supply, even without growth of consumption. It was proposed to instal a complete new section of manufacturing plant, with a capacity of 4,000,000 c.ft. per day; and the estimated cost was £250,000. This included the cost of complete plant, right up to the gasholder. The yearly output this would provide would be 960,000,000 c.ft., representing 890,000,000 c.ft. sold, which worked out at £276 per million. It did not take into account the cost of land, and things of that sort, because it was already available. The figure was quite an economical one. The new plant would meet the requirements for five years, and leave a margin of only 6 p.ct. on the maximum week.

Witness, in cross-examination, said the Directors had not yet

decided to spend the £250,000 on works. They had started to consider it in December last.

Mr. Tyldesley Jones then made further reference to the principle of law previously referred to. It had been stated that, inasmuch as the Board of Trade had made Provisional Orders fixing standard prices under the Gas and Water Works Facilities Act, 1870, the Board could now fix standard prices by Orders under section 10 of the Gas Regulation Act. The principle was that, whether there was an Act of Parliament under which a certain administrative practice had grown up—whether it was originally right or wrong was immaterial—if Parliament subsequently, knowing of this administrative practice, enacted something to the same effect as the earlier Act, the Courts would hold that Parliament had intended that administrative practice to continue. The Board of Trade could fix a standard price under section 10 of the Gas Regulation Act—*i.e.*, they could do what they had done previously under the Act of 1870.

Mr. Ronca said that Counsel had directed his remarks to showing that the Board had power to do this; but it was only fair to point out that having the power to do it, and doing it, were two different things. Although Parliament might have recognized that the Board had power, Parliament might, nevertheless, as a policy, decide that this was a thing to be done only on rare and special occasions. But Counsel had gone rather out of his way to indicate that there were special circumstances obtaining in this case. He (Mr. Ronca) considered that in this case there were special circumstances obtaining.

Mr. Tyldesley Jones said he put forward two points. The first was that the Board had jurisdiction. The mere fact that they had jurisdiction, however, did not "carry him home," because, if the Board came to the conclusion that there were no grounds which justified their acting under section 10 of the Gas Regulation Act, and that they ought to revise the Company's standard price under section 1, then they ought to turn-down the present application and proceed on an entirely new basis. But he had put forward this case on special grounds, which he considered justified him in applying for the fixing of a new standard; and he did not think this was objected to. It was on the ground that there were special circumstances that he asked the Board to make the Order.

This concluded the Company's case.

Mr. *Arthur Valon* (Messrs. W. A. Valon & Son, Civil Engineers, Westminster) then gave evidence on behalf of the County Council, and, in the first place, acknowledged the help the Company had rendered him in arriving at his figures, by giving him full information. On the question of a fair dividend, he said his view was that it should be the dividend paid in the last pre-war year, which was 6 p.ct., although the Company had not actually earned 6 p.ct. The selling price of 2s. 3d. per 1000 c.ft. at that time was the price to the ordinary consumer in the Company's inner area, and not the average price in the whole area, over part of which a differential rate operated. It was the relevant price so far as dividend was concerned, but might not be the relevant price in the fixing of a new standard price. He agreed that the pre-war selling price of 2s. 3d. per 1000 c.ft. was too low, inasmuch as the dividend paid was not earned in the year ended June, 1914. As indicated by Mr. Harker, the selling price should have been about 2s. 6d. It was only possible to charge a price as low as 2s. 3d. in 1913-14 in the inner area, because of the differential in the outer area. If, in the last pre-war year, the Company had raised their price in order to cover the deficit between the dividend paid and the dividend earned, they would have had to reduce the statutory dividend to £5 13s. 4d. This did not take into account the abnormally low sum spent on repairs; but if an adjustment were made for that, the price would have had to be still further increased, and the statutory dividend decreased by another two points—*i.e.*, to £5 6s. 8d. If there had been no differential in the outer area, the economic price would have been 2s. 9d. per 1000 c.ft., so that the real saving that had to be contemplated, in order to pay a dividend of 6½ p.ct., when the differential disappeared, was from 2s. 9d. to 2s., and not from 2s. 3d. to 2s. There was nothing to prevent the Company carrying on as they had done in the past, if they chose to; and he did not think they would regularize their position until they had a chance of issuing ordinary stock at 6 p.ct. As the result of agreeing to the Company's figure for net cost of supply, he had to add 0·32d. per 1000 c.ft. to his estimate. This raised the figure he had estimated as being the new standard price from 11·35d. to 11·42d. per therm; so that his suggestion that it should be fixed at 11·4d. was near enough.

Witness (in cross-examination) said he would have expected that, by amalgamating the Bromley and West Kent Companies with the South Suburban Company in 1912, and concentrating the manufacture of gas in one works at Belvedere, there would have been economies; but he did not believe the Company would have effected sufficient economies to enable them to abolish the very large differentials which previously existed, and also to increase their dividend.

Mr. Tyldesley Jones said that in 1911, the year before the amalgamation, the authorized dividend was £5 15s. By June, 1914, the authorized dividend, and the dividend paid, was £6; so that they had already gained some advantage. In the second half of 1912 the dividend was 6 p.ct., and there was a surplus of £1300; the price of gas being 2s. 3d. In the first half of 1913 the price and the dividend remained the same; there being a surplus of £1738. So that the price of 2s. 3d. was justified at that time, although it was not likely that the economies resulting from amalgamation would have been realized.

Witness said some of them would have been realized, but not all; and he pointed out that there was a deficit in the latter half of 1913 and the first half of 1914.

Mr. Tyldesley Jones asked if, in arriving at what was a reasonable return on capital, the Board of Trade had to consider its market valuation.

Witness said he wished he were sure of this; but he was not.

Mr. Tyldesley Jones pointed out that in the latter half of 1911, immediately before the amalgamation, the Company actually paid a dividend of £5 16s. 8d.; and according to Mr. Valon's argument, they would only get another 3s. 4d. p.ct. by reason of the amalgamation and all the economies effected by it.

Witness said he thought that was all they would get.

Mr. Tyldesley Jones: Then the Company were wasting time by amalgamating?

Witness replied that he did not think there was much in it for a big Company.

Mr. Harker, addressing Mr. Ronca on behalf of the London County Council, referring particularly to the estimated capital expenditure for the five years to 1930, said he would not dissent from the proposition that future capital expenditure was one of the items which a tribunal fixing a new standard price should properly take into account; but he submitted that, in the circumstances of this case, the Company were not justified in asking for it to be taken into account, because apparently it was not until December of last year that any question of reconstructing the works was even considered by the Directors. That was a time when, to say the least, there were possibilities of the County Council's application for revision being put forward. He also suggested an alteration to the clause in the Order which provided for the revision of the Company's standard price in the future. The view he was putting forward had not been urged before, and was contrary to precedent. The clause in the Order was of the ordinary type, giving the Board of Trade power to revise the price if costs and charges of, and incidental to, the production and supply of gas had substantially altered from circumstances beyond the control of, or which could not reasonably have been avoided by, the Company. His suggestion was to omit the words "from circumstances beyond the control of, or which could not reasonably have been avoided by, the Company." His reason was that one of the matters in respect of which the Company hoped to make considerable economies was in connection with the building of the Belvedere Works. As the Company had promoted an Order under section 10 of the Gas Regulation Act, and had put themselves forward as being in a special position, it would be only right that the local authorities should have an opportunity of applying for a revision fixed under this Order unencumbered by the construction put upon the words he had asked to be omitted. It would still give the Board of Trade absolute discretion, which would protect the Company if local authorities were advised to make repeated and harassing applications for revision.

Mr. Tyldesley Jones agreed that the future capital expenditure referred to was only now under the consideration of the Directors; but, even if they did know of the County Council's contemplated application for revision when they had first considered it, this was immaterial. If the facts given by Mr. Terrace were right, he did not care if the matter had not been before the Directors at all. Those facts must have their play, whether the Directors had considered the matter or not. As to the form of the revision clause, the fact that the County Council asked for something which was contrary to precedent made it clear that there must be some very strong grounds for the alteration before it could be made. The result of the suggested alteration, however, would be to take away from the Company the incentive to effect economies from circumstances within their control. Was this to the advantage of the public? Of every economy made, six-sevenths was given to the consumers; and were the County Council really solemnly asking the Board of Trade to say that the Company were to be in the position that they were never to be able to effect economies voluntarily, except at the peril of having every penny piece taken from them? The sliding-scale would be torn up; and this, unfortunately, was one of the mischiefs of the Gas Regulation Act as it stood. It was depreciating the value of the sliding-scale; and the County Council would now put a coping-stone on it, and take away all the advantages of it. If the County Council's request were acceded to, the Company would never be able safely to spend a penny piece of capital in order to effect a saving, because they would then be open to revision. He asked the Board of Trade not to listen to the suggestion, which was the most detrimental proposition that could possibly be made to the interests of the consumers of gas.

EXHIBITION AT STOCKTON.

A Gas Exhibition held last week in the Borough Hall, Stockton, was a source of enjoyment and instruction to thousands of people.

The opening ceremony took place on Monday, March 7. Mr. T. Wilkinson, Chairman of the Gas Committee, presided, and the Mayoress, Mrs. L. Ropner, declared the exhibition open.

The Chairman remarked that the purpose of the exhibition was to demonstrate the uses and value of gas, and added that town dwellers were apt to take for granted the many privileges and facilities offered by various branches of utility services. He pointed out that gas played an important part in everyday life, being an economical and healthy way of producing light, heat, and power. One reason why the Gas Committee were anxious to do all they could to cultivate the use of gas was because they wanted to diminish the contamination of the atmosphere brought about by the burning of raw coal. Going on to refer to the importance and success of the gas undertaking in Stockton, Mr. Wilkinson said that about £336,000 had been spent on it; over £200,000 had been devoted to the relief of the rates from the profits, and the outstanding capital debt was a matter of £100,000. He hoped no one would run away with the idea that gas was a back number. In 1881 the consumption in Stockton was 142 million c.ft., and in 1925 it was 568 millions. Electricity was a formidable competitor in Stockton, but he believed it would work in harness with gas. Mr. Wilkinson also referred to the valuable nature of the residuals extracted during carbonization.

During the run of the exhibition, which was excellently staged, and, in addition to displays of the latest types of apparatus, included a mantle-making exhibit, Miss Tuxford gave cookery demonstrations. These were greatly appreciated; and the Gas Committee and Mr. W. W. Atley, the Gas Engineer, are to be congratulated.

PRICES OF GAS METERS.

An Explanation by Parkinson & Cowan (Gas Meters), Ltd.

Fitzalan Street Works,
Kennington Road, London, S.E. 11.
9th March, 1926.

As our attitude in regard to this matter is being misrepresented, we consider it only fair to ourselves and to buyers that we should put the following facts before the gas industry, merely premising that, but for this misrepresentation, we would not obtrude our views on the subject.

Owing to circumstances for which we are not responsible, there has been for nearly eighteen months very keen price competition in the meter trade, resulting in serious loss; and as this condition of affairs may cause buyers some concern as to the maintenance of that high quality of manufacture which is so essential in gas meters, we respectfully suggest that the subject of this letter is of special importance to them.

For some time we have advocated what is practically a profit-sharing scheme, whereby gas undertakings would be guaranteed that *all* meter makers would supply only the best quality of meters, at the lowest possible prices, consistent with that quality and a fair margin of profit.

A considerable majority of meter firms have signified their general approval of the principle of such a scheme, while a minority are opposed to it; and for the time being, therefore, the present unsatisfactory trade conditions continue.

Briefly stated, the scheme provides for the organization and pooling of manufacturing and other facilities throughout the trade, so that by mass production methods in the manufacture of the component parts of meters, and by other means, costs would be very materially reduced, and buyers would obtain a substantial share of the resulting economies, after prices had first been restored to a reasonable level, based on present-day costs.

This scheme would be carried out by an amalgamation of all meter firms, and its chief advantages from the buyers' point of view, we submit, are that (1) all meters purchased from any firm would be of a uniformly high quality; (2) the manufacturers' profit would be limited to a moderate percentage return on the capital of a Central Company acquiring the shares of the different firms at valuations in which inflation would be studiously avoided; and (3) the economies effected through joint working would, to a large extent, be applied for the benefit of buyers, while the meter makers' inducement to work for such economies would be participation to a smaller extent in the result, this in effect being the principle of the well-known sliding-scale.

While amalgamations do not always appeal to buyers, it will be recognized that in special circumstances the benefits of an amalgamation may be mutually advantageous to buyer and seller; and it appears to a majority of the firms in the meter trade that in the case of their trade there are special circumstances justifying an amalgamation which has as its main feature profit sharing. The buyers of meters are not the general public, but gas undertakings, limited in number, having opportunities for conferring on matters of mutual interest, and with whose officers the sellers come into close business contact; and as it is to the interest of meter makers that any assurances given by them to their customers shall be fully carried out, there need be no doubt as to the *bona fides* of the scheme under consideration.

As regards the ability to effect economies and thereby to reduce selling prices, it need only be mentioned that in Great Britain and Ireland there are some seventy meter works, a number demonstrably much in excess of normal requirements. It is therefore clear that very large economies could be effected by closing-down redundant works, disposing of unnecessary plant, adopting automatic and up-to-date machinery, and specializing at certain factories in the mass production of meter parts.

An amalgamation would also effect economies by:

(1) Reducing overlapping motor transport services.
(2) Standardizing production.
(3) Reducing the aggregate of stocks, as the present minimum stock of each factory working independently would be no longer necessary, and could be safely and profitably reduced.
(4) Gradually reducing expenses of management, selling, and distribution, and other overhead expenses.
(5) Wholesale buying of materials.
(6) Unifying processes at different factories, &c.

Another advantage of an amalgamation is that improvements and new inventions in meters would be the common property of all associated meter makers, and available for the benefit of all buyers.

In fairness to those firms who, on various grounds, oppose an amalgamation, it may be mentioned that the principal arguments urged against it are that:

(1) Gas undertakings might be unfavourable to such a scheme.
(2) The closing-down of redundant factories would mean loss of capital
(3) The Directors of the present meter firms prefer to manage their own individual businesses, instead of being subject to a Board of Control of a Central Company.

To the first of the objections we reply that the usual form of amalgamation, which only takes care of the sellers' interests, would have nothing to commend it to gas undertakings, but rather the reverse, for it would be a means of advancing selling prices to an extent which the buyers might consider excessive. This, indeed, is the objection to any "conference" for the maintenance of selling prices; and yet, while the profit-sharing scheme herein described is meeting with opposition, the formation of a re-constituted conference is still being strongly urged for the purpose of restoring prices. But in that matter we are in a minority, having refused to co-operate in any scheme which, lacking the element of permanency, does not take into equal consideration the buyers' interest. We believe, however, that buyers will recognize that a profit-sharing scheme would protect their interests; and that the answer to the first objection is, therefore, that gas undertakings would not be unfavourable to it.

Those who take the view that the closing-down of redundant factories would mean heavy capital loss, disregard the essence of the scheme, which is that, by closer working, large economies would be effected which, by individual effort, it would not be possible to achieve. These economies would, in a large measure, go towards the reduction of selling prices, by way of rebates; but even in the first instance, before the economies were effected, buyers would not be called upon to pay more for their meters than prices based on the cost of manufacture, *plus* a reasonable profit. Redundant factories would only be closed gradually as and when the reorganization of other factories had been effected with resulting economies; and these economies would be supplemented by the savings in overhead charges due to the closing-down of factories. The stocks and useful plant of the latter would be readily absorbed, and their other properties would be sold, so that the capital loss would not be large and would be made good out of the manufacturers' share of surplus profit arising out of the economies effected.

As to the preference which Directors of some of the present meter firms have for managing their own businesses instead of being subject to a Board of Control of a Central Company, this is quite natural, and is, indeed, shared by all; but a majority recognize that the advantages far outweigh this objection—besides which, the executive of the Central Company would be composed entirely of meter makers interested in the reorganization and consolidation of the meter trade as a whole, while the individual Directors of existing companies would continue to act in an administrative capacity.

If we are asked why we are desirous of safeguarding buyers' interests, it may be answered that, by adopting this scheme, manufacturers will also protect their own interests by stabilizing the trade on a mutually sound basis. Price conferences, which exist only for the purpose of maintaining prices, are unsatisfactory, and engender suspicion. They are also of temporary duration, and, in the nature of things, are one-sided, and cannot accomplish cost reductions, and consequent price abatements, to any appreciable extent.

In conclusion, we submit that on the foregoing lines, an amalgamation of meter firms would undoubtedly result in large economies to the benefit of buyers, this having been the experience of gas undertakings, whose consumers, in the districts taken over, have saved considerable sums each year by means of the amalgamation of the supplying companies.

In this connection the following extract from a recent Editorial of the "Gas World" is interesting:

> "We have for many years sought to encourage the principle of undertakings coming together for the purposes of unifying manufacture and cutting out the expensiveness of separate operation, wherever combination is practicable. We therefore particularly welcome Mr. Milne Watson's reference to this subject at the Gas Light and Coke Company's meeting: 'I believe that the principle underlying amalgamation is, in general, sound, and I hope to see an increased number of amalgamations in the gas industry.' The National Gas Council has now seen fit to give official encouragement to this policy. . . ."

It has been unfairly asserted that our object is to close down "the smaller makers." There is nothing further from our intention than this; indeed, the scheme of amalgamation is in their best interests, and those opposing it will be responsible not only for depriving buyers of the advantages of a profit-sharing scheme, but for any further loss which meter makers will suffer by reason of the present unremunerative selling prices.

Having now explained our position in regard to the present state of the trade, we are content to let the matter rest, with the assurance that we shall always maintain the high quality of our manufactures.

PARKINSON & COWAN (GAS METERS), LTD.

Dover Gas Stock Issue.—An issue of £5000 of new stock (7½ p.ct. maximum) in the Dover Gas Company is being made by Messrs. A. & W. Richards, on behalf of the Directors. From the announcement appearing in our advertisement pages, it will be seen that tenders must be received by the firm at 37, Walbrook, London, E.C., by Thursday morning, March 25, and that the minimum price at which tenders will be considered is £105 per £100 of stock. Extensions of the works, plant, and mains are rendered necessary by the growing demand for gas.

Lancaster Gas Department.—There was a protest, at a recent meeting of the Lancaster Town Council, against the allocation of £1000 prospective profits of the Gas Department. Councillor Till, the Chairman of the Gas Committee, regretted that the Finance Committee would not allow them to place next year's profit to the reserve. It would be much wiser to let the ratepayers meet their liabilities, instead of taking capital from a Department which required it. The Corporation ordered the prospective profit to be allocated to the rates.

GAS COMPANIES' RESULTS IN 1925.

Further Gas Sales Records.

Andover.

Moving the adoption of the report and balance-sheet at the annual meeting of the Andover Lighting and Power Company, Mr. W. P. Clarke (Chairman) said that the gas sales showed an increase of 6 p.ct. The price had been reduced by ½d. per therm at the beginning of 1925. He moved the payment of a dividend of 5 p.ct. per annum, less income-tax. This was carried.

Blyth.

At the annual meeting, Mr. Herbert Lees, of Hexham, complimented the Blyth Gas Company upon the sound financial position of their undertaking. A dividend for the half-year ended Dec. 31 at the rate of £3 17s. 6d. p.ct., less income-tax, was declared, and the sum of £1225 was transferred to the reserve fund.

Brentwood.

Out of a disposable balance of £7114, the Brentwood Gas Company have declared final dividends (less tax) which, with the interim distribution, make 8 p.ct. on the original stock and £5 12s. p.ct. on the additional stock for the year.

Chichester.

The half-yearly meeting was presided over by Mr. Joseph Cash, in the absence through illness of the Chairman (Mr. W. A. Walker). Dividends were declared at the rate of 10 p.ct. per annum on the "A" capital and 7 p.ct. per annum on the "B" and "C" capital, all less income-tax.

Colchester.

The sales of gas increased by 4½ p.ct. during 1925, following an increase of 6 p.ct. higher in the previous year. During the year a large number of additional fires, cookers, and other appliances were fixed; and all branches of the business show steady expansion. The extensions to the carbonizing plant were completed in the autumn. The cost of these extensions amounted to £10,319, of which £3000 has been paid out of revenue during the past year, and £6000 carried to a suspense account to be written-off out of revenue in the future. In deciding on this course, the Directors had in mind the necessity of allowing for depreciation on the original plant and the desirability of conserving the capital of the Company, on which heavy demands have been made for the provision of stoves, mains, &c. The total expended capital of the Company now stands at £614 per million c.ft. of gas sold, which is a moderate figure considering the modern condition of the works and plant, and the large number of stoves and meters belonging to the Company. The gross profit on the past half-year's working amounts to £6112, compared with £5880 for the corresponding period of 1924. The following dividends were declared at the annual meeting: On the "A" shares, £6 7s. 6d. p.ct.; and on the "B" shares, £4 9s. 3d. p.ct. per annum, both less tax.

Crowborough.

The Directors' report and statement of accounts for the working of the Crowborough District Gas and Electricity Company during 1925 show an increase of over 6 p.ct. on the gas sales. The sale of electricity has doubled. At the annual meeting, the Chairman (Mr. G. W. Howard) moved the declaration of a dividend of 5½ p.ct. per annum, which was carried.

Gosport.

At the annual meeting of the Gosport and District Gas Company, dividends were declared making a total distribution for the year of 5 p.ct. on the preference stock, and 7 p.ct. on the consolidated ordinary stock. Mr. W. E. Churcher, who presided, dealing with the development of the Company's business, stated that the output had more than doubled itself in the last few years, and amounted last year to 296 million c.ft., while the returns for January and February indicated that a new record would be made this year. The increased sales in Gosport during the year amounted to 12,597,000 c.ft., and the increased sales in Fareham had also exceeded all anticipations, resulting in a reduction of price in that area. The sales department had also experienced a record turnover of nearly £10,000. For the first time in the experience of the Company, the Gosport works, which had been admirably reconstructed by the Engineer and General Manager, Mr. E. Allison, produced in December over 1 million c.ft. per day; and the Christmas Day output of 1,250,000 c.ft. showed an increase of 44 p.ct. over the maximum day's output in 1924. Turning to the accounts, Mr. Churcher stated that the capital expenditure (£51,000) included the purchase price of the Fareham Gas Company's undertaking. On the other side they had received £25,000 of new capital, and in addition £27,000 had been issued in exchange for the stock and bonds of the Fareham Company. The revenue from the sale of gas amounted to nearly £50,000—an increase of £11,000—and the gross profit was £8766, as against £5562 in the previous year.

Grantham.

Presiding at the half-yearly meeting of the Grantham Gas Company, Mr. J. G. Thompson said that the new carbonizing plant had been in full working order during the year, and had given results exceeding expectation. The retort settings were built by Robert Dempster & Sons, Ltd., of Elland. They had made more gas than in the corresponding half-year, and with 1000 tons less coal. Their balance-sheet was excellent.

Guildford.

The sale of gas during the half-year ended Dec. 31 last shows an increase of 11,685,800 c.ft., or 9·3 p.ct. as compared with the corresponding period of last year. The increase over the whole year amounted to 9·1 p.ct. The balance standing to the credit of the profit and loss account, including the balance brought forward from the previous account, was £14,013. Out of this sum the Directors recommended the payment of dividends as follows: On the preference stock, 5 p.ct.; and on the consolidated ordinary stock, 7 p.ct. per annum, both less income-tax. This left £8771 to be carried forward. To meet the anticipated demands of the near future, an order has been placed with Messrs. Humphreys & Glasgow for a 1 million c.ft. per day carburetted water gas plant, to be ready by November. The extension of the Company's main to Shere and Gomshall is now being proceeded with. A new contract has been secured with the Corporation for the street lighting of the borough for five years (the Corporation own the electricity undertaking).

Hartlepool.

The profit of the Hartlepool Gas and Water Company for the year 1925 amounted, with £12,578 brought forward, to £46,818; and a dividend was paid for the year of 5 p.ct., less income-tax—leaving a balance of £10,885 to be carried forward. There were 2729 additional fires and cookers installed during the year; and the quantity of gas sold increased by 21 million c.ft.

Ipswich.

At the general meeting of the Ipswich Gas Light Company, Mr. Henry Woodall, M.Inst.C.E. (Chairman and Managing Director), who presided, said that they had had to withdraw £2500 from the renewal fund. In June last they issued £7500 new consolidated stock, which was quickly sold, and they received a premium of £636, which showed the confidence the local investing public had in the Company. An additional £1500 was issued under the co-partnership scheme, making the total issue £9000. In addition they had received £1925 of loan capital. Their capital account was now over-spent by only £5817, as against £11,099 last year. They had expended on capital account £6270. The amount spent on new buildings had justified itself. Their improved showroom had attracted more people, and their sales there had increased in a most satisfactory manner. The expenditure on new mains and services was higher than last year, which pointed to increased business. They had redeemed during the year £2470 redeemable stock, making the total to date £7210, leaving still £14,590 to redeem. It was satisfactory to note that coal and oil had cost £6765 less than last year, though they had made and sold more gas. The cost of repairs and maintenance of works was rather higher, in consequence of the extensive renewals to their settings of vertical retorts. Repairs and maintenance of mains and services had also cost more by £1300. It was very well spent money, tending to improve the supply and to reduce the amount of unaccounted-for gas. The total expenditure was £143,918—a reduction of £3200. On the receipts side, their income from sale of gas was slightly less than last year, but this was due entirely to the cheaper rate. For the first six months of 1924 their charge was 9·6d. a therm, making the average selling price for that year 9·3d. per therm, whereas for the whole of 1925 it was 9d. per therm. This reduction represented a sum of £3800; but thanks to the larger quantity sold, the actual decrease in receipts was only just over £300. The sale of gas constituted a record in the history of the Company. There had been a reduction of £3800 in the receipts for coke and breeze. The total receipts amounted to £157,068, and their expenditure to £143,918, showing a balance of profit of £13,150. This sum was not quite sufficient to meet their standing charges and dividends on ordinary capital; but they brought forward into profit and loss account a larger sum last year, and after deducting the dividend recommended there would be carried forward to next year the satisfactory amount of £15,288. The Company's area of supply was expanding, and the business was growing on all sides. They would shortly have to build a new gasholder. They had a site available for the purpose, but a large expenditure under this head had to be faced. A dividend at the rate of £6 7s. 6d. p.ct. on the consolidated stock, and £5 p.ct. on the redeemable stock, less income-tax, was declared.

Isle of Thanet.

At the annual general meeting of the Isle of Thanet Gas Light and Coke Company, the Chairman (Mr. Walter Hills), in moving the adoption of the report and accounts, said that another record had been created in the quantity of gas made. This was 470 millions, against 450 in 1924—an increase of 4½ p.ct. The gas consumed represented a total increased income of £752. Capital now stood at the low figure of £372 per million c.ft. With regard to residuals, as a consequence of the lower prices, coke had suffered by £4246, breeze by £3, tar by no less than £2487, and sulphate by £780, making the revenue from this source less by £7516. Rates and taxes were less by £622, in addition to £812 saved the year before. Income-tax payments were also down over £1000. The sale of fittings had risen from £591 to £1443, showing the volume of business passing through the showroom. There was an increase of 383 meters on hire, and 357 cookers were bought last year, in addition to 394 gas fires and 148 geysers. The Chairman then moved that a dividend be declared at the rate of 7 p.ct. for the year, of which an interim dividend of 3½ p.ct. was paid in September last, the balance of an equal amount to be paid on or after March 25 next. Mr. J. Gill seconded the resolution, which was carried.

Launceston.

A reduced price of gas and an increased revenue were reported at the annual meeting of the Launceston Gas Company, Ltd., when a dividend of 8 p.ct., less income-tax, was declared.

Newmarket.

At the annual meeting of the Company, the Chairman (Mr. R. Stephenson, J.P., D.L.) said that the profit was rather more than last year. They had sold more gas to the extent of £430, but the returns from residuals were down by £1396. As regards repairs, the purifiers were practically worn out, so that in the near future about

£2500 would have to be spent on them. He proposed that a dividend at the rate of 8 p.ct. per annum be declared. This would leave £10,739 to be carried forward. The Directors had made arrangements for renewing two benches of retorts during the coming summer.

Penistone.

An increase in gas sales during the year ended Dec. 31 of 4·66 p.ct. was reported by the Penistone and District Gas Company; and a final dividend on the ordinary shares, making 9 p.ct. for the year, was declared, leaving a balance of £223 to be carried forward. The Directors recorded with the deepest regret the death in July last of the late Chairman, Mr. Herbert Unwin, whose connection with the Company was unbroken from its formation in 1858, and to whose "life-long zeal in the Company's interests its present position is mainly due."

Redhill.

Presiding at the annual meeting of the Redhill Gas Company, Mr. W. Lees Stenning, M.B.E., J.P. (Chairman), said that, following the acquisition of the Godstone District Gas Company in 1924, the necessary linking-up of the mains with Redhill was successfully completed during last autumn. The manufacture of gas was discontinued at Godstone, and better pressure established throughout that district. The opening-up of new building estates, both within the Borough of Reigate and in the outlying districts, had increased the capital outlay on mains to the comparatively large amount of £18,000; and the capital outlay on plant, &c., at their works, and on cottages for their employees, had amounted to £8073. To meet this outlay, an issue of 5 p.ct. debenture stock was made in September last, and was readily taken up by existing stockholders. The revenue from gas increased to £78,000, or £6000 over that of 1924, while residuals realized £12,061, or £3800 less than in the previous year. After providing for the fixed charges and the dividends they recommended, there would remain an amount of £1657 to be carried forward, which was £500 less than the balance from the previous year. The increase in output of gas was 5·4 p.ct. It would be noticed that their contribution to the co-partnership scheme was £1300 for the past year. The co-partners were evincing their interest in the Company by voluntarily increasing their capital holdings in it. The Chairman proposed that the following dividends be paid: On the cumulative preference stock, 6 p.ct.; on the preference "A" stock, 5½ p.ct.; and on the "B" ordinary stock, 5½ p.ct. per annum, all less income-tax. Mr. W. H. Bennett (Managing Director) seconded the resolution, which was carried unanimously.

Romford.

At the half-yearly meeting of the Romford Gas and Coke Company, Ltd., accounts were submitted which showed that, after carrying the revenue profit of £7363 to profit and loss account, there was a total available balance of £9624. Out of this the Directors recommended that the following dividends should be declared for the half-year: On the "original" shares, 7¼ p.ct.; on the "B" shares, 5¾ p.ct.; and on the preference shares, 3 p.ct.—all less income-tax. These, together with the amount required for the reserve fund, debenture interest, and other charges, would leave £972 to be carried forward. The dividends as recommended were declared. The sale of gas showed an increase of 7·39 p.ct. over the corresponding period of 1924. The Chairman (Mr. Henry Johnson) announced that the Company had various works of extension on hand—including new vertical retorts and purifiers.

Seaham.

Presiding at the annual meeting of Seaham Gas and Lighting Company, Mr. Malcolm Dillon spoke of two misapprehensions which he said he would like to remove. The first was that the Seaham Gas-Works belonged to Lord Londonderry. His Lordship's interest as a shareholder, however, was a relatively moderate one. The second was that the Directors were not opposed to the introduction of electricity into the town. They had always felt that it would come; and if the town desired it, there would certainly be no opposition on the part of the Company. There would always be a demand for gas; and there was no reason why in Seaham, as in other towns, gas and electricity should not both be profitable to the purveyors and to the public. He was apprehensive of only one thing—that the supply of electricity conducted by the Urban Council, who had no experience of work of this kind, might prove to be unprofitable. The Company were asking for the insertion in the Urban Council's Electricity Order of clauses providing that any loss on the undertaking was not to be a burden on the rates, and that the scale of charges for public lighting must not exceed the price of lighting to private consumers. Dividends were declared at 8 p.ct. per annum on the "A" stock and "B" shares, 6 p.ct. per annum on the "C" stock, and 4½ p.ct. per annum on the preference stock.

Seaton.

The annual meeting of the Seaton Gas Company was held on March 3—Mr. C. F. Gosney presiding. The Directors' report and balance-sheet for the year ended Dec. 31 last showed a profit of £780. On the motion of the Chairman, seconded by Mr. Gould, it was decided to declare a dividend of 6 p.ct., less tax.

Sheffield.

Presiding at the annual meeting of the Sheffield Gas Company, Col. H. K. Stephenson, D.S.O. (the Chairman), said that during 1925 gas sales had increased by over 291 million c.ft.—an increase of 6·35 p.ct., following upon one of 5 p.ct. for the previous year. They had, however, to cope with a severe slump in all residuals, resulting in a largely decreased revenue therefrom. It was therefore most satisfactory that, after payment of dividends, there remained a balance of £79,555 to be carried forward—and this without any increase in the price of gas. The price remained at 7d. per therm, or 2s. 11d. per 1000 c.ft., for small consumers, with proportionate reductions to large customers; the lowest price being 4d. per therm, or 1s. 8d. per 1000 c.ft. At their last annual meeting he informed them that they had acquired the undertakings of the Dronfield and Woodhouse Gas Companies; and he was glad to say that, under the auspices of the Sheffield Company, the sales of gas had been increased at both places—by 8½ p.ct. and 10 p.ct. respectively. Showrooms had been opened with good results at both Dronfield and Woodhouse, and they had extended the gas supply to Dronfield Woodhouse, where over 90 p.ct. of the inhabitants were now consumers. Not only had the acquisition of these two undertakings meant more business, but it had proved of great advantage to the districts concerned. The reduction in price in the Dronfield area was 1s. 4d. per 1000 c.ft., and in the Woodhouse area 1s. 3d. Referring to the Government electricity scheme, Col. Stephenson said that the prices charged by small undertakings in country districts, whether for gas or electricity, were much higher than those charged in populous centres like Sheffield. The remedy was the same in both cases—viz., the distribution by large undertakings, whether of gas or electricity, over a wide area. It would be necessary for the gas industry to meet electrical competition by similar measures. As most districts, however small, already possessed a gas supply with a distributive organization, it would be a much simpler matter to link these up than to link up the electricity undertakings under the Government scheme. The extension at Dronfield proved what an easy thing it was to supply gas under pressure to outlying areas. Whether the Government were prepared to assist such a scheme, he was unable to say. With regard to the work of the past year, they would be pleased to hear that there had been a demand for gas supplies in the case of practically all new property within their area. To meet this demand, it had been necessary to lay nearly 25 miles of new mains, and to instal no fewer than 6417 new services. Mains had been, or were being, laid to the following Corporation housing estates: Manor Estate, Gleadless Estate, Herries Road (Norwood Estate), and Overton Road (Hillsboro' Estate). The work of their Distribution Department showed no signs of decreasing; and even with the large staff of fitters they now employed, it was difficult to cope with the work. All descriptions of gas apparatus were in request, particularly for cooking and heating. The special attention which was now being given by one of the inspectors to the fixing and maintenance of hot water appliances had resulted in an increased number of orders for geysers, circulators, "B.T.U." boilers, garage heaters, &c. In many new houses no coal-fired kitchen ranges were being installed. In these houses the cooking was done entirely by gas; and hot water was provided either by gas or by a coke boiler. The demand for prepayment meters continued. Nearly 6000 were fixed during the past year, bringing the total up to 18,000 in 2¼ years—a striking testimony to the popularity of gas among the workers. In spite of the competition they now had to face from electric prepayment installations, they were receiving additional orders at the rate of 80 to 100 meters per week. The reorganization of their industrial department, which was carried out last year, had met with success. They were now able to keep in much closer touch with local manufacturers; and no fewer than 60 new furnaces had been installed during 1925. In addition to this, various coal-fired furnaces had been converted to gas, while, also, a number of old gas furnaces which had been put out of use were reconnected. The sales of appliances during 1924 constituted a record. That record had been passed during 1925; the increase amounting to several thousand pounds in money value. During the past year they sold—excluding appliances let on hire—2640 gas fires, 2034 cookers, and 2245 boiling burners and grillers, as well as 525 circulators, geysers, and boilers, and 678 oven squares, making a total of 8122 appliances. During the latter part of November a new departure was made in the sale of coke by offering graded coke in small quantities put up in bags. This provision for the needs of those whose storage facilities were small had been much appreciated; and by the end of December no fewer than 4758 orders, ranging from two to ten bags, had been taken at the showrooms. It was a pleasure to congratulate the Watch Committee on the notable improvement which had been effected since the lighting engineer was appointed. The two-light superheated burners which had been installed on his recommendation had been commented upon most favourably. The results, remarked the Chairman, amply proved his contention that, given proper appliances, gas was the best and most effective, as it was also the most economical, illuminant for streets and public places. About 290 new street lamps had been connected-up during the year in Sheffield; while at Dronfield an agreement had been made with the Council for the lighting, extinguishing, and maintenance of the street lamps in their district. Generally, the past year had been one of continuous expansion in all departments. Not only had they sold more gas and more gas appliances, but the works had given better returns. These good results were due in no small measure to the excellent management of Mr. Halkett, and to the loyal co-operation of his staff and of the employees generally. The Chairman moved, and Mr. R. Leader seconded, the resolution authorizing the payment of the dividends, making the total distribution for the year 5¾ p.ct.

Swansea.

At the annual meeting of the Swansea Gas Light Company, Mr. E. H. Leeder (Chairman), in moving the adoption of the report and the statement of accounts, said that, notwithstanding the continued industrial depression, the accounts for the past year showed an improvement over those of 1924. The total expenditure was £181,209—£15,176 less than in 1924. While slightly more had been spent on the maintenance of the distribution system, and while the expenditure on oil, &c., for the manufacture of carburetted water gas proved greater, practically every other item showed a decrease. They had a complete year's working of the new coal gas plant at Morriston; and the benefits therefrom were reflected in the decreased expenditure in respect of coal, wages at works, and repairs and maintenance at works. They had had the benefit of a reduction of local taxation. Despite increased receipts from sales of gas and fittings, the total receipts were £8921 lower than those of the preceding year. The explanation was to be found in the slump in residuals, which brought in £12,714 less than in 1924—equivalent to about 4d. per 1000 c.ft., or

o·9d. per therm. Fortunately, as a result of the economies in expenditure referred to, they had been able to carry to net profit and loss account an amount sufficient to meet interest and dividend charges. For the benefit of those whose confidence in the future of gas might be wavering, as a result of the intensive propaganda of their competitors, he would like to say that during the past year they had had 14 million c.ft. increased gas sales, and 808 new consumers. The average consumption per consumer had increased. If such results could be obtained during a time when industrial conditions were admittedly difficult, he submitted that much greater expansion might be confidently anticipated when trade improved. He was pleased to announce that, as from the reading of the indices at the end of the March quarter, the price of gas to all consumers would be reduced by o·6d. per therm, equivalent to nearly 3d. per 1000 c.ft. The Directors had placed contracts to the extent of approximately £50,000 for the erection of the first water gas section at Morriston. It was hoped that this plant would be available towards the end of the present year. On previous occasions he had spoken of the Company's co-partnership scheme and of the superannuation scheme; and they would be interested to hear that 80 p.ct. of the employees were holders of the Company's ordinary stock, and that 28 p.ct. of the ordinary stockholders were employees of the Company. Notwithstanding the Widows, Orphans, and Pensions Act, the employees were still maintaining their original rate of contribution to the superannuation scheme inaugurated in January, 1924, and the Company naturally were doing likewise. The amount now being paid to pensioners under the scheme was at the rate of £354 per annum; and the amount standing to the credit of the fund was £7613, which amount was highly satisfactory, considering the scheme had only been in operation two years. Colonel Lewis seconded the motion. Dividends at the rate of 7 p.ct. per annum on the redeemable preference stock and 5 p.ct. per annum on the ordinary stock were declared.

Thirsk.

During last year there was a satisfactory increase in the consumption of gas at Thirsk; and out of the profits the Gas Company are paying a dividend which, with the interim distribution, makes 6 p.ct. for the year.

Tunbridge Wells.

That the Tunbridge Wells Gas Company continues in a most flourishing condition was proved at the annual meeting, when the Chairman (Mr. H. A. Beeching) said that the receipts from the sale of gas showed a satisfactory increase. Manufacturing costs were down by £3700, and distribution costs showed a decrease of £450. The profit and loss account showed a balance of £21,458, or about £800 more than the previous year; and after payment of dividends there was a sum of £15,975 to be carried forward. A co-partners' pension fund had been inaugurated in July last; £878 being the Company's contribution under the scheme. The payment of the following dividends was agreed to: On the consolidated ordinary stock, 13½ p.ct.; on the consolidated "B" stock, 11 p.ct.; and on the consolidated "C" and "D" stocks, 10½ p.ct. per annum. The Secretary (Mr. C. F. Catt) referred to the adoption of a special system of inspection of appliances in consumers' houses. Two inspectors were doing this work; and the results were gratifying.

Uttoxeter.

The sale of gas during 1925 was 46 million c.ft., which constitutes a record. During the year, 54 new consumers have been connected up. At the annual meeting the Chairman (Mr. C. H. Cowlishaw) said it was anticipated there would be a continued increase in the demand for gas in the district, and a new gasholder would have to be erected.

Winchester.

A 6 p.ct. increase in the sale of gas over the corresponding period of the previous year was reported at the half-yearly meeting of the Winchester Water and Gas Company; and a dividend for the six months on the consolidated ordinary stock at the rate of 5 p.ct. per annum, less income-tax, was declared, leaving a balance of £602 to be carried forward. The gas supply is being extended to Allbrook, a rapidly increasing district near the south-eastern boundary of the Company's statutory area.

Windermere.

There has been an increase of 7 p.ct. on the quantity of gas sold. The net profit for the half-year ended Dec. 31 is £532, which, together with the amount brought forward, makes a balance on profit and loss account of £2505. Out of this the Directors recommend the payment of the following dividends, all less income-tax: On the preference shares, 4 p.ct.; on the new preference shares, 6 p.ct.; and on the ordinary shares 5 p.ct. per annum. This will leave a balance of £2199 to be carried forward.

Woking.

The Directors of the Woking District Gas Company report for the half-year ended Dec. 31 that the quantity of gas sold, as compared with the same half of 1924, shows an increase of 7·78 p.ct. Dividends are recommended at the rate per annum of 6 p.ct. on the "A" and "B" ordinary stocks. There will be a sum of £3019 to be carried forward to the next account.

Worthing.

A Special Order of the Worthing Gas Light and Coke Company was approved by Parliament last December, whereby the parish of Findon has been added to the area of supply, the authorized capital of the Company has been increased, and other provisions of a beneficial character have been sanctioned. The increased output of gas necessitates an immediate enlargement of the manufacturing plant. This, and the contemplated extension of the supply to Findon, will involve the raising of further capital. At the half-yearly meeting an important increase in business was reported, and a dividend was declared for the six months on the consolidated ordinary stock at the rate of 6½ p.ct. per annum less income-tax.

FOOD EXHIBITION AT HORNSEY.

The Hornsey Gas Company co-operated with the Town Council in connection with a clean food exhibition recently held in Christchurch Hall, Crouch End. The Company's exhibit, which occupied the greater portion of one large room, was characterized by its variety. It was under the direction of Mr. V. Roberts, the Controller of the Sales Department of the Company, who, together with his assistants, explained to an interested public the advantages of gas for all purposes. The room was illuminated at night by different types of burners by William Sugg & Co.

In the display, contrast was used with marked effect. An old-fashioned coal range demonstrated the inconvenient and costly method of cooking in vogue some years ago; and adjoining this relic of the past were a "New World" cooker by Radiation Limited, fitted, together with domestic pattern "Ideal" coke boiler manufactured by the National Radiator Company, in a recess. Nearby were a Sugg's "Chef" cooker and a "Medusa" fire, by Radiation, Limited, fixed in a Turner surround. A Davis gas incinerator for household refuse, and a "Crystal" gas iron by the same firm, attracted considerable attention. One of Richmond's latest cookers was on view; and demonstrations were carried out on a cooker made by Fletcher, Russell, & Co.

There was plenty of "B.C.G.A." literature, a good deal of it indicating the advantages of a smoke-free air. To the Hornsey Gas Company, and to Mr. J. W. Buckley, the Engineer and General Manager, great credit is due for taking part in an educational movement which made a direct appeal to large numbers of the general public, and awakened their interest in the value of a smokeless fuel.

In opening the exhibition on March 2, Mr. Neville Chamberlain, Minister of Health, appealed to housewives to help to mitigate domestic smoke by using gas and electric appliances. "I have under consideration at the present time," he said, "a new Bill to assist in smoke abatement. You may be surprised to know that in London as a whole there falls on every square mile every year over 25 tons of soot. Sometimes the soot is caught in the air, and produces fog. Always it intercepts the sunlight, which means so much to the vitality and health of everybody. The new Bill will give local authorities greater powers of regulating the emission of smoke from factory chimneys. But I am up against this difficulty—that it is not the factory chimneys that make most of the smoke. It is estimated that every year, throughout the whole of the country, there is emitted from chimneys three million tons of soot in the form of smoke. Out of that three million tons, half-a-million is from factories, and two-and-a-half millions from domestic hearths. How are we to grapple with that? I cannot pass a law that nobody may make smoke out of a domestic chimney. In some parts of Germany, even in industrial districts, they are free from smoke because everybody uses gas or electric cookers and fires, instead of coal fires. In Birmingham to-day they are making the most wonderful gas cookers and stoves. I do not know whether they are exhibited here—Birmingham is generally on the spot when there is any business to be done—but I want to say to you that, if you instal gas cooking stoves in your houses, not only will you put yourselves in the position of rivalling the cooking of the most marvellous professional chef of the Ritz or the Carlton, but you will also be making your contribution towards the solution of the smoke problem."

A Tableau at the Hornsey "Clean Food" Exhibition.

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Ironfounders to
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Carron Gas Cookers——

Irresistibly appeal to the practical housewife. It means a new era in the kitchen for her, and a satisfied consumer for you.

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NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Last week began, as the previous one had ended, in a state of idleness, with business practically at a standstill. This condition of weakness was accentuated by the wild weather conditions. Tonnage was held up in wholesale fashion, and a number of collieries found great difficulty in keeping working, and were willing in many cases to cut prices considerably in order to obtain spot boats.

The publication of the report later in the week, while not altering the spot position, caused a general marking-up of prices for forward positions. The strong recommendation that the subsidy should be discontinued, and the absence of any specific remedy without wages reductions for the situation that would thus arise at the end of April, caused the market to halt. The position at the moment is that it is trying to find its feet.

Quotations generally were marked up on Thursday, and a few collieries were able to book orders at higher figures. But there is no indication as yet that buyers are willing to pay the higher prices, and at the time of writing the market is not quite so firm. It may, however, be reasonably anticipated that a position of uncertainty will exist at least for several weeks, which will maintain a firm market for this month and next, and still further restrict business beyond that.

Nominal quotations are 19s. to 19s. 6d. f.o.b. for Wear Specials, and about 18s. for best qualities. Seconds are 14s. 6d. to 15s. There has been more inquiry for coking coals, and 14s. to 15s. is asked according to quality.

The coke market remains quiet and dull, gas makes quoting 21s. 6d. to 22s. 6d. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

Consideration of the Coal Commission report is being given by the various parties involved, but until the Government show some sign of making a move the coal trade is in a rather difficult position.

House coal in Yorkshire and Lancashire during the past week has been in moderate demand, with prices steady.

The industrial situation does not improve, and the same remark applies to export.

Gas coals, in the open market, are inclined to be rather weaker, owing to the lengthening days and the approach of warmer weather.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 20s. 6d. to 20s. 9d.; screened gas coal, 20s.; washed trebles, 20s. 6d.; washed doubles, 19s. 9d.; washed singles, 17s. 6d. to 17s. 9d.; washed smalls, 12s. to 12s. 3d.; unwashed doubles, 18s.; rough slack, 9s.; smithy peas, 19s. to 21s. 6d. West Yorkshire—Hartleys, 17s. 9d. to 18s. 9d.; screened gas coal, 20s.; washed trebles, 20s.; washed doubles, 18s.; washed singles, 17s.; washed smalls, 12s. to 12s. 3d.; unwashed trebles, 17s. 6d.; unwashed doubles, 14s.; coking smalls, 9s. 6d. to 10s. Derbyshire and Nottinghamshire: Top hards, 20s. 6d. to 22s. 6d.; washed singles, 17s. to 17s. 6d.; washed smalls, 11s. 6d.; rough slack, 9s. 3d. to 9s. 9d. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 17s. 6d. to 18s. 6d.; gas coke, 20s. to 21s.; furnace coke, 16s. to 17s.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The critical stage which has been reached in the controversy over the re-adjustment of the coal mining industry to changed conditions is becoming more definitely reflected in current business. There is no very pronounced stimulation of demand at the time of writing, but collieries are indifferent to the attitude assumed by buyers. Concessions are not to be thought of now. Inquiries which are coming in for April supplies are treated with reserve. Spot lots of slacks and smalls can no longer be bought at the very low prices ruling a fortnight ago. Sharper weather has combined with the dread of a rupture to give a brisker tone to the trade in domestic fuel. Opinions in the trade are divided as to the upshot of the recommendations of the Commission for tiding over the tension which is the immediate anxiety. Some traders hold that a clash is inevitable, others that the meagreness of the fighting fund and the lack of solidarity in the ranks of the miners will defeat any attempt to hold up the industry. The Commissioners' report inspires no enthusiasm in any direction, as it is felt the proposals for regenerating the industry are hypothetical, and no sufficient means of implementing them can be perceived. A trade view is that reversion to the eight hours' day would have been more efficacious and less objectionable to many of the miners than a reduction of wages.

Prestatyn Gas Undertaking.

The rapid growth of Prestatyn as a residential and holiday resort was given at a recent Government inquiry as the reason for the Urban Council's proposed expenditure of £12,000 on extending the gas-works and supplying new mains. It was further explained that, when a loan was granted for similar purposes three years ago, it was contemplated that the works then carried out would be sufficient for a considerable period; but so many new estates had been developed, and the consumption of gas had so considerably increased, that the carrying-out of the present scheme was imperative. The inquiry was conducted by Mr. J. Gardner, and there was no opposition. Mr. S. Trevor Roberts, the Engineer, said that when the Council took over the gas undertaking in 1909 the annual make of gas was about 5 million c.ft., but it now reached 39 millions. The plant had become inadequate, and some of it was in a bad state. At the close of the inquiry the Inspector viewed the works.

TRADE NOTES.

Ewart Geysers.

The well-known firm of Ewart & Son, Ltd., have published a new descriptive catalogue of their various manufactures.

+ G.F. + Fittings.

The Le Bas Tube Company, Ltd., have issued an abridged catalogue of their + G.F. + malleable tube fittings, which shows in concise form the parts and sizes in general use and which can be obtained from stock.

Bitumen Melting Plant for Tottenham.

On the recommendation of the Chief Engineer, Mr. H. C. Smith, the Tottenham District Light, Heat, and Power Company have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for a bitumen melting plant, to be built as an addition to, and to work in conjunction with, the "T.I.C." tar plant already installed at the Tottenham Works.

"T.I.C." Plant for Cambridge.

On the recommendation of their Engineer and Manager, Mr. J. W. Auchterlonie, the Cambridge University and Town Gas Light Company have placed an order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for a combined "T.I.C." tar treatment plant and bitumen melting and mixing plant. The tar plant has a capacity of 20 tons of crude tar per 24 hours, and is capable of producing tars to the Road Board Specification, and the bitumen plant is capable of mixing up to 20 p.ct. bitumen with the tar produced.

CONTRACTS OPEN.

Purifier Boxes.

The Gas Committee of the Burnley Corporation are inviting tenders for the supply and erection of six cast-iron purifier boxes. [See advert. on p. 713.]

Pipes, Oils and Paints, Meters, Cookers, and Stores.

The Colwyn Bay and Colwyn Urban District Council are inviting tenders for the supply of main pipes, wrought iron and copper tubes and fittings, general stores, oils and paints, meters, cookers, and brass and gunmetal goods. [See advert. on p. 713.]

CURRENT SALES OF GAS PRODUCTS

The London Market for Tar, Tar Products, and Sulphate.

London, *March* 15.

The price of pitch continues to firm up, and business is reported possible at about 87s. 6d. per ton for prompt shipment. For October/December the market is steady at about 80s. per ton.

Creosote is firm at 7⅛d. to 7¼d. per gallon net and naked at works.

Pure benzole and pure toluole are steady at about 2s. 2d. per gallon; and 95/160 solvent naphtha at about 1s. 10d. per gallon.

Pyridine is firm at about 20s. per gallon.

Tar Products in the Provinces.

March 15.

The market for tar products has remained firm, although business has been quieter.

Pitch maintains its price, and there is still a fair amount of inquiry for both the prompt and the forward positions.

The average values for gas-works products during the week were: Gas-works tar, 56s. to 61s.; Pitch, East Coast, 84s. to 85s. f.o.b. West Coast—Manchester, 77s. to 78s.; Liverpool, 78s. to 79s.; Clyde, 81s. to 82s. Benzole, 90 p.ct. North, 1s. 8¼d. to 1s. 9¼d.; crude, 65 p.ct., at 120° C., 1s. 1d. to 1s. 2d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 8¼d. to 1s. 9¼d. Toluole, naked, North, 1s. 8d. to 1s. 9d., nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 11½d. to 1s. 0¼d. Creosote, in bulk, North, liquid, 6¼d. to 6½d.; salty, 6d. to 6⅛d.; Scotland, 5¾d. to 6d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2¼d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Buxton Gas Undertaking.—The annual statement of the Buxton municipal gas undertaking shows a profit of £5554 on the past year's working, and a considerable increase in the output.

The Colonial Gas Association, Ltd.—A cable has been received from Melbourne stating that at a recent meeting of the Directors interim dividends were declared at the rate of 8 p.ct. on the preference shares, and 9 p.ct. per annum on the ordinary shares, for the half-year ended Dec. 31 last. The dividends will be payable on April 10.

City Gas Examiner's Report.—In his annual report, Mr. W. Duffield, the City Gas Examiner, says that the gas supply continues to be eminently satisfactory. In the case of No. 1 Testing Station, the minimum figure for the heating power of the gas on any one day was 485·8 B.Th.U. per c.ft., while the maximum reached 521·9 B.Th.U. In the case of No. 2 Testing Station, the minimum was 488·4 B.Th.U., and the maximum 515·5 B.Th.U. The testing made daily at the office showed even better results—viz., 479·1 B.Th.U. minimum, and 525·8 B.Th.U. maximum; the standard heating power prescribed being 500·0 B.Th.U. The number of gas meters tested was 102,181, and the fees totalled £6211. As compared with the previous year, the number of meters decreased by 640, while the fees increased by £118. The number of prepayment meters tested was 53,118.

Education of Apprentices in the Engineering Trades.

The London Association of Foremen Engineers, which, during its 74 years of existence, has attempted in various ways to encourage apprentices in the industry, has this year revised its programme, and, in conjunction with the London County Council, has established a scheme for the award of prizes to approved students of mechanical engineering who submit finished pieces of work for competition in accordance with specified conditions. There will be awards of £5 and gold medal; £2 and silver medal; and £1 and bronze medal; and a silver shield to the Institution presenting the winner of the first prize. Candidates must be following a satisfactory course of evening instruction in mechanical engineering at an Institution aided or maintained by the London County Council. Competitors must submit a finished piece of work done at the Institution at which they are receiving instruction, or at their employers' workshops. Mr. J. T. Bettamy, Mr. P. A. Clarke, and Mr. R. E. Trevethick have consented to act as judges. The prizes will be presented by Viscount Chetwynd at the 73rd anniversary festival, to be held at the Cannon Street Hotel on May 8. The articles manufactured by the boys will be shown at the Regent Street Polytechnic on March 25, 26, and 27.

European Gas Company, Ltd.

The report to be submitted to the shareholders at the meeting on Thursday, March 25, is for a period of nine months only, to Dec. 31 last. It states that, though the workings in France have been satisfactory, and have resulted in a substantial profit in francs, this has been more than neutralized by the heavy depreciation in the value of the franc. Between April 1 and Dec. 31, 1925, the quotation had risen from 89f.85 to the pound to 129f.81 to the pound; and further depreciation of this order would have most serious consequences for the Company. The inconveniences of a financial year running from April to March have made themselves increasingly apparent under the present abnormal conditions; and the working results of six summer months have ceased to furnish a reliable basis on which to estimate the possibility of paying an interim dividend and its amount. In these circumstances, the Directors decided to alter the financial year so as to make it coincide with the calendar year. As the year will in future fall naturally into two periods of practically equal value, the possibility of paying an interim dividend can be estimated with more certainty and accuracy. For the nine months, April to December, 1925, there was, for the reasons already stated, a loss of £6931. There was, however, a balance standing to the credit of general revenue of £37,436, which, after writing off this loss, is reduced to £30,504. This reserve has been added to in recent years for the express purpose of providing a dividend in abnormal circumstances such as the present; and the Directors recommend, therefore, that a dividened of 4s. per share, free of income-tax, be paid on April 1, in respect of the period, April to December, 1925, and that it be provided from general revenue account, which will thus be reduced to £10,461. The consumption of gas shows an increase of 2·29 p.ct. over the corresponding nine months of the previous year, and the number of consumers has risen from 139,121 to 142,472, an increase of 3351, or at the rate of 2·4 p.ct. in the nine months. The works and plant at the stations have been maintained in a state of efficiency; and work has continued methodically on the examination of the system of mains and the replacement of defective pipes.

Semi-Gas Houses at Leeds.—What are locally termed "semi-gas" houses are to be the order for the majority of the houses on the new York Road Corporation housing estate at Leeds, by agreement between the City Improvements, Gas, and Electricity Committees. The houses will have one coal fireplace, will be electrically lighted, and will have a gas cooker, two gas fires in the bedrooms, a gas wash-boiler, and a gas hot water apparatus.

Maryborough (Queensland) Gas and Coke Company.—Despite electrical competition, the sales of gas for the half-year ended Dec. 31 last show a substantial increase over the corresponding term of 1924. The expenditure also shows a considerable increase over 1924, due principally to advances in price of coal and wages, and also to the fact that the Company paid no State and Federal income-tax during the 1924 term. After writing off £600 for depreciation, transferring £206 to reserve fund (under the provisions of the Gas Act), and making provision for all other charges, the profits amount to £2438; and the Directors recommend that this amount be dealt with as follows: Payment of a dividend of 7 p.ct. per annum, £1443; transfer to reserve for renewals and contingencies, £621; leaving a balance of £372 to be carried forward.

Radiation Limited.—At the general meeting of shareholders to be held in Birmingham next Wednesday (March 24), the Directors will present the balance-sheet of the Company as at Dec. 31, 1925. After bringing £109,719 forward from 1924, the balance of the revenue account is £297,675. Deducting the interim dividends paid in July last, there remains at disposal the sum of £233,343, which the Directors recommend be appropriated as follows: To pay a final dividend of 3 p.ct. on the preference shares, less income-tax, £26,100; a final dividend of 3¾ p.ct. on the fully-paid ordinary shares, free of income-tax, £48,798; a bonus of 6d. a share on the fully-paid ordinary shares, free of income-tax, £34,855; a final dividend of 3½ p.ct. on the partly-paid ordinary shares, free of income-tax, £5297; a bonus of 3d. a share on the partly-paid ordinary shares, free of income-tax, £3783—carrying forward £114,507.

In order to deal still more effectively with their constantly growing business, Messrs. Walker, Crosweller, & Co., have removed to 54-58, Queen Elizabeth Street, London, S.E. 1. Here they have a fine modern building. The firm's telegraphic address has been modified to "Instrukemi, Boroh, London," and their new number is Hop 5786.

STOCK MARKET REPORT.

NEW issues are again dominating business on the Stock Exchange. The most important of those announced last week were the two Trade Facilities Acts loans. They were the £2,000,000 Pearson & Dorman Long in respect of the development of the Kent coal mines, and the £2,750,000 Union Cold Storage Blue Star Line. There are many other more or less attractive issues pending, and the prospect of speculative business is therefore considerably discounted. Last week's business was also restricted by other influences; the Coal Commission report, the engineering dispute, the French Cabinet crisis, and the anxiety due to the League of Nations all had an adverse effect. Despite these handicaps, however, quotations were moderately firm, and any attempts at bearing prices were quickly countered.

Gilt-edged stocks were extremely quiet, and prices were perhaps a little easier, with the exception of India loans, which improved on the Budget report, and the London County Council loan.

There were no important changes in the quotations of Gas Stocks. Liverpool 5 p.c. ordinary dropped ¾ on the local Exchange, and Chester 5 p.c. ordinary was marked down 2½ points on *ex* div. quotation. The business done was rather smaller than usual; and it is possible the unanimous advice given by the Chairmen at the annual meetings to stockholders not to sell their holdings may have had some effect. Attention may be drawn to the attraction of the debenture stocks. Three per cents. can be obtained for about 56-57, and 4 p.c. stocks for about 72-74, realizing at average prices 5'31 p.c. and 5'48 p.c. respectively. There are, however, more attractive yields than these. For example, Alliance and Dublin 4 p.c. debenture at 60½ yields 6'61 p.c.

The following transactions were recorded during the week:

On Monday, Brighton and Hove 172½, Cape Town 7½, Croydon 95, 96 *ex* div., European 5¾, Gas Light and Coke 77⅛, 77¼, 77⅛, 77⅜, 3½ p.c. maximum 58¼, 58½, 4 p.c. preference 76, 3 p.c. debenture 58, 58¼, 58⅜, Imperial Continental 137, Primitiva 11s. 0¾d., 4 p.c. debenture (1911) 66¼, 67¼, South Metropolitan 90½, 90¾, 90 15/16, 91, 91¼ *ex* div., Tottenham "B" 88¼. Supplementary prices, Colonial Gas Association 8 p.c. preference "New" 3d. pm., North Middlesex 5 p.c. debenture 95½, 96, York Town and Blackwater 5½ p.c. debenture 96, 96½.

On Tuesday, Alliance and Dublin 70⅜, 71, Brighton and Hove original 172½, 173¼, British 104½, Continental Union 33⅛, European 6 3/16, Gas Light and Coke 77¼, 77⅜, 77⅛, 78, 4 p.c. preference 74½, Imperial Continental 137, 138, Montevideo 71¼, 72¼, Primitiva 10s. 9d., South Metropolitan 90½, 91½ *ex* div., South Suburban 95 *ex* div., Tottenham "B" 88⅜. Supplementary prices, Barnet "D" Water stock 109, Colonial Gas Association new 1¼d., 2¼d., 3d., 4¼d. pm., 8 p.c. preference "New" 1¼d., 2¼d., 3d., 4¼d. pm.

On Wednesday, Gas Light and Coke 77¼, 77⅜, 78, 78¼, 4 p.c. preference 74, Imperial Continental 138, 138½, 3½ p.c. debenture 69½, 70, Oriental 101½, Primitiva 10s. 6d., 10s. 10½d., 11s., 4 p.c. (Buenos Ayres) debenture 67, 4 p.c. debenture (1911) 67, South Metropolitan 90½, 91 *ex* div., 3 p.c. debenture 58¼, South Suburban 5 p.c. 95½, 96, *ex* div., Southampton 79, 79½. Supplementary prices, Colonial Gas Association new 3d., 4½d. pm. Danish 7⅝.

On Thursday, Bournemouth "B" 12⅛, 12 3/16 *ex* div., British 102½, Gas Light and Coke 77⅛, 77⅜, 78, 78¼, 78⅛, 3½ p.c. maximum, 58, 4 p.c. preference 74, Imperial Continental 139, Primitiva 10s. 6d., 4 p.c. (Buenos Ayres) debenture 66¼, 67, South Metropolitan 90½ *ex* div., 3 p.c. debenture 57½, South Suburban 95 *ex* div. Supplementary prices, Colonial Gas Association new 1d., 1¼d., 3d., 4¼d. pm.

On Friday, Bombay 19s. 3d., Bristol 5 p.c. 86, 86½ *ex* div., Gas Light and Coke 77⅜, 78, 78⅛, 78¼, 78½, 3½ p.c. maximum 58, 4 p.c. preference 74, 75, 3 p.c. debenture 58 Imperial Continental 139, Montevideo 72, 72½, Oriental 101, 102, Primitiva 10s. 7½d., 10s. 10¼d., 11s., South Metropolitan 90½, 90¾, 91 *ex* div., 3 p.c. debenture 57½. Supplementary prices, Colonial new ordinary 1d. pm., 8 p.c. preference "New" 1d. pm., Danish 7⅛, Sutton 106.

There was an abundant supply of loanable credits available in Lombard Street at the close of the week. Banks lent freely, and borrowers obtained fresh accommodation at as low as 3½ p.c. Discount quotations were on the whole well maintained; the average rate at which the Treasury Bills were allotted—£4 7s. 10·54d. p.c.—being about equal to the market estimates. For the first time since Nov. 20 last a small allotment of bonds was made; £400,000 being sold at £94 1s. p.c.

The uncertainty of the position at Geneva had little effect on Foreign Exchanges, which remained quiet. French francs closed at 133.42½. Belgian francs cheapened to 107.10, and Italian lire closed at 121. Sterling on New York remained unchanged at 4.86 3/16.

Silver was easier on Chinese sales, the spot price falling to 30 5/16d. per oz. Gold was bought by the Continent at 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Mar. 12.	Rise or Fall.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 4	5	5	Aldershot 5 p.c. max. C.	74—77	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—74	..	..
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	69—73	..	70⅜—71
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	58—63	..	..
300,000	1	Oct. 22	1/7⅛	1/7⅛	Bombay, Ltd.	7/8—1	..	19/3
170,000	10	Mar. 4	8½	8½	Bournemouth 5 p.c.	12—13*	..	12⅛—12 3/16
425,050	10	,,	7	7	Do. B 7 p.c.	12—12½*	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12*	..	..
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
214,740	,,	Aug. 27	12½	12½	Brighton & Hove Orig.	172—177	..	172½—173⅜
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	..
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91a	..	86—86½
855,000	,,	Oct. 8	7	8	British Ord.	101—106	..	102½—104½
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref.	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—74	..	..
100,000	10	Dec. 17	8	6	Cape Town, Ltd.	6½—7½	..	7½
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	Feb. 18	6	6	Cardiff Con. Ord.	96—99	..	..
237,860	,,	Jan. 7	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Mar. 4	5	6½	Chester 5 p.c. Ord.	87½—92½b*	−2½	..
79,185	1	Oct. 8	—	2/-	Colombo Ltd. Ord.	25/—27/-	..	..
24,500	1	,,	—	1/4½	Do. 7 p.c. Pref.	21/—25/-	..	..
1,513,280	Stk.	Mar. 4	5½	5½	Commercial 4 p.c. Cap.	76—81*	..	..
560,000	,,	,,	5/8/4	5/8/4	Do. 3½ p.c. Cap.	76—81*	..	..
475,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	55—58	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	33—38	..	33½
200,000	,,	Mar. 4	7	7	Do. 7 p.c. Pref.	85—88*	..	..
737,150	,,	Mar. 4	6½	6½	Croydon sliding scale	95—98*	..	95—96
403,100	,,	,,	5	5	Do. max. div.	79—82*	..	..
492,270	,,	Mar. 4	6	9	Derby Con.	107—109c*	−2	..
55,000	,,	Dec. 17	4	4	Do. Deb.	74—76c	..	..
209,000	,,	Mar. 4	5	5	East Hull Ord. 5 p.c.	86—89*	..	..
50,000	,,	Dec. 17	—	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	July 23	4	6	European, Ltd.	5⅜—6⅝	..	5⅜—6 5/8
16,413,285	Stk.	Feb. 18	5½	4/17/4	Gas Light & Coke 4 p.c. Ord.	77—79	..	77⅛—78½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61	..	58—58½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—77	−1	74—76
4,761,930	,,	Dec. 17	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58—58⅝
130,000	,,	,,	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb	..	..	..
82,500	,,	Sept. 10	6⅝	6⅝	Hastings & St L. 5 p.c. Conv	90—95	..	..
258,740	,,	,,	5⅝	5⅝	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	19⅜—20⅜	..	..
86,600	Stk.	Mar. 4	10	10	Hornsey 7 p.c.	128—133*	..	..
1,976,000	,,	Nov. 19	59	10	Imperial Continental Cap.	135—140	..	137—139
226,170	,,	Feb. 4	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	69½—70
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Feb. 18	5½	5½	Liverpool 5 p.c. Ord.	81—81½b	−¾	..
600,000	,,	Sept 24	7	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
165,736	,,	Feb. 18	9	8	Maidstone 5 p.c. Cap.	115—120	..	..
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb.	54—59	..	..
75,000	5	Dec. 3	7	6	Malta & Mediterranean	4½—5	..	..
541,920	Stk.	Nov. 19	4	4	Montevideo, Ltd.	70—74	+1	71½—72½
2,061,315	,,	Mar. 4	5	5	Newcastle & Gateshead Con.	73—74d*	+½	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	75—76d*	..	..
529,705	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb.	70—72d	..	..
15,000	,,	Mar. 4	11½	11½	North Middlesex 10 p.c.	155—160*	..	..
91,530	,,	,,	8 5/16	8 5/16	Do. 7 p.c.	112—117*	..	..
300,000	Stk.	Dec. 3	7	9	Oriental, Ltd.	98—103	..	101—102
188,120	,,	Jan. 7	7⅛	7⅛	Plym'th & Ston'house 5 p.c.	110—115	..	..
60,000	50	Mar. 4	14	14	Portsea Island B	90—95*	..	..
100,000	50	,,	13	13	Do. C	88—93*	..	..
2,289,309	1	—	—	—	Primitiva Ord.	10/6—11/6	−/3	10/6—11/0⅜
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	82—84	..	..
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	66—68	+1	66¼—67½
193,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	66—68	+1	66½—67
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7⅞—8¼	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	..	..
270,000	Stk.	Aug. 27	5⅜	5¼	Sheffield A	100—102e	..	..
419,968	,,	,,	5⅜	5⅜	Do. B	100—102e	..	..
1,047,000	,,	,,	5¼	5⅜	Do. C	100—102e	..	..
90,000	10	June 11	6	4	South African	5—7	..	..
6,609,895	Stk.	Mar. 4	5	7	South Met. Ord.	90 92*	..	90½—91⅞
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb.	56—59	..	57⅛—58½
734,000	,,	Mar. 4	6½	6½	Do. 6½ p.c. Red. Db.	102—104*	..	..
91,500	,,	Mar. 4	8½	8½	South Shields Con.	121—123d*	..	..
1,187,795	,,	Mar. 4	6½	6½	South Suburban Ord. 5 p.c.	95—98*	..	95—96
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94 97	..	..
647,740	,,	Oct. 22	5	5	South'mpton Ord. 5 p.c. max	78—81	..	79—79½
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69 74	..	..
250,000	,,	Mar. 4	7	7	Swansea 7 p.c. Red. Pref.	100—102*	..	..
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	Feb. 18	7⅜	7⅜	Tottenham District A 5 p.c.	107—112	..	..
882,275	,,	,,	5⅜	5⅜	Do. B 3½ p.c.	86—91	..	88½—88⅝
150,000	,,	,,	28/4	5½	Do. 5½ p.c. Pref.	101—103	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	..
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	69 70d	..	..
197,294	,,	Mar. 4	6⅜	6⅜	Do. 5 p.c. pref.	90—95*	..	..
88,330	,,	,,	5	5	Do. 5 p.c. Maidenh'd	85—90*	..	..
91,800	,,	,,	6⅜	6⅜	Wandsworth, Wimbledon, and Epsom—	87—92*	..	..
30,000	,,	Mar. 4	8½	8½	Wandsworth A 5 p.c.	123—128*	..	..
255,636	,,	,,	7	7	Do. B 3½ p.c.	103—108*	..	..
412,450	,,	,,	5/19/0	5/19/0	Do. C and New Wimbledon 5 p.c.	88—93*	..	..
352,000	,,	,,	6⅝	6⅝	Epsom 5 p.c.	97—102*	..	..
98,000	,,	,,	7⅛	7⅛	3 p.c. Deb.	105—110*	..	..
88,416	,,	Jan. 7	3	3		55—58	..	..

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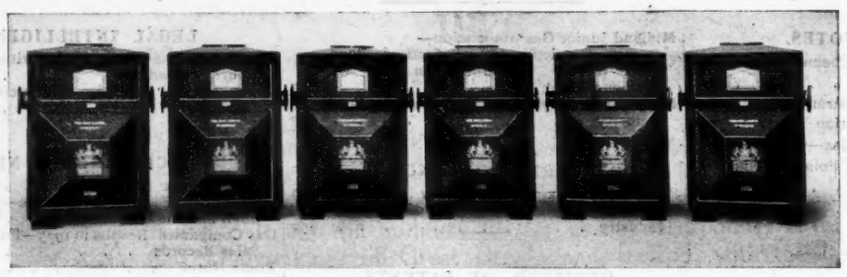

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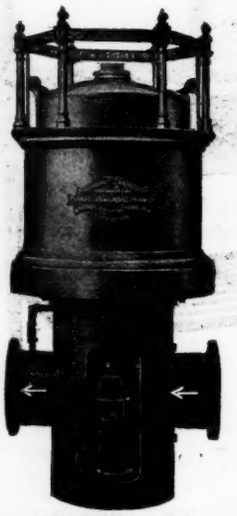

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